

# WATER QUALITY

# 4

Clean water is essential for healthy estuaries. Water is the basic life-sustaining element linking all the characteristic features of New Hampshire's estuarine environment. Efforts to improve water quality drive the Action Plans developed to address the priority problems threatening the estuary. The NHEP focuses on improving water quality as the most effective way to attain measurable environmental improvements, and to communicate to citizens and decision-makers the need to protect all aspects of our region's natural resources. Improving and protecting estuarine water quality calls for correcting current problems and pollution sources, and for preventing future problems as New Hampshire's Seacoast region continues to grow.

The mixing of ocean saltwater with inland and coastal freshwaters creates the unique and highly productive conditions of the estuaries. These special environmental

conditions are reflected in the richness of estuarine habitats. Estuaries play a unique role as nurseries for living resources of not only the estuarine, but also marine and upland ecosystems.

Pollutants in New Hampshire's estuaries include bacterial, toxic, and nutrient contaminants from municipal and industrial wastewater treatment facilities, septic systems, sediments, fertilizers, other runoff, plus oil spills and contaminated sites in the watersheds. Current and future sources of contamination must be reduced and prevented. Most of these water quality problems are directly related to human activities.



NHEP

*Upper Cocheco River,  
New Hampshire*

## WHY IT MATTERS

Clean water is essential to the rich variety of unique habitats and diverse plant and animal communities found in New Hampshire's estuaries. Clean water is also vital for many human activities at the heart of the Seacoast economy and cultural traditions. Groundwater, precipitation, wetlands, and surface waters of the rivers, lakes, streams, and the Gulf of Maine of the Atlantic Ocean all affect water quality in the estuaries, reflecting the complexity and interconnected nature of estuarine systems. Human activities and natural processes influencing any of these water sources ultimately influence the water quality of the estuaries.

The priority water quality contaminants in New Hampshire's estuaries are:

- Pathogenic microorganisms (fecal-borne bacteria and viruses) from improperly treated sewage, urban stormwater runoff, and other non-point sources;
- Nutrients from sewage treatment plants and non-point sources such as tributaries, surface runoff, septic systems, atmospheric deposition, etc.;
- Toxic contaminants (organic chemicals and heavy metals, from oil, solvents, pesticides) from historic industrial sources and from current industrial and municipal wastewater and atmospheric deposits;
- Sediments from upland watersheds or rivers carried into the estuaries by runoff.

## THE CHALLENGE

Pollution abatement efforts in New Hampshire's estuaries began in the 1940s, and continue today. Much progress was made through the 1970s and 1980s and into the 1990s, with the installation and upgrading of municipal wastewater treatment systems. Water quality and habitat areas have recovered significantly. Bacterial contamination has been decreasing in the last decade in most of the state's coastal areas, largely due to upgraded wastewater treatment facilities (WWTFs).

But pollution problems remain and continuing vigilance and planning is needed to protect estuarine water quality from the pressures of population growth and development. Treatment plant hydraulic overloading including pump station overflows and bypasses, combined sewer overflows (CSOs), and illicit connections to storm sewers all contribute human sanitary waste to estuarine waters. The shellfish beds are closed when treatment plants fail, pump stations overflow, and CSOs discharge. Non-point sources of pollutants also increase with added development. *Chapter 5: Land Use, Development, and Habitat Protection* addresses non-point source pollution through actions to limit impervious cover and sprawl, and to protect tidal and freshwater wetlands, groundwater, and shorelands.

While there are no grossly contaminated areas, all New Hampshire estuarine waters are subject to **bacterial contamination** for some time each year. Fecal coliform bacteria are measured as indicators of sewage contamination,



to warn of threats to public health and safety. People can become ill from eating contaminated shellfish or from contact with water polluted with pathogenic microorganisms. Concentrations of these indicator bacteria are generally quite low throughout the estuaries, and estuarine water quality supports most uses in most areas. Still, contaminants persist in all estuarine waters and at levels – especially during or after rainfall or snowmelt runoff events – that require limiting uses such as shellfish harvesting to protect human health. Stormwater runoff carries pollutants into estuarine waters from combined sewer overflows, impervious areas like roadways, parking lots and roofs, ineffective septic systems, vessel discharge, pet waste, and possibly waterfowl.

**Heavy metals and toxic compounds** are also found throughout the estuaries, with higher levels concentrated around Seavey Island and the Portsmouth Naval Shipyard and other hot spots including Rye Harbor. Much of the toxic contamination in New Hampshire's estuaries is the legacy of historic industrial activities in the

## BACTERIAL CONTAMINATION

A three-year study of how storm events affect water quality in the tributaries of the Great Bay Estuary confirmed urban runoff as a source of contamination. Fecal coliform bacteria are monitored as an indicator of pathogenic microorganisms. Concentrations are generally quite low in many areas, at a level of water quality that supports most uses. However, elevated concentrations of fecal coliforms were detected in all areas following rainfall events. Stormwater bacterial contamination of the Great Bay Estuary is well documented, and efforts continue to identify the sources. Recent studies found many sources of stormwater contamination in coastal New Hampshire towns – including stormwater drains, sewer pipes, stormwater treatment systems, and animal feces.

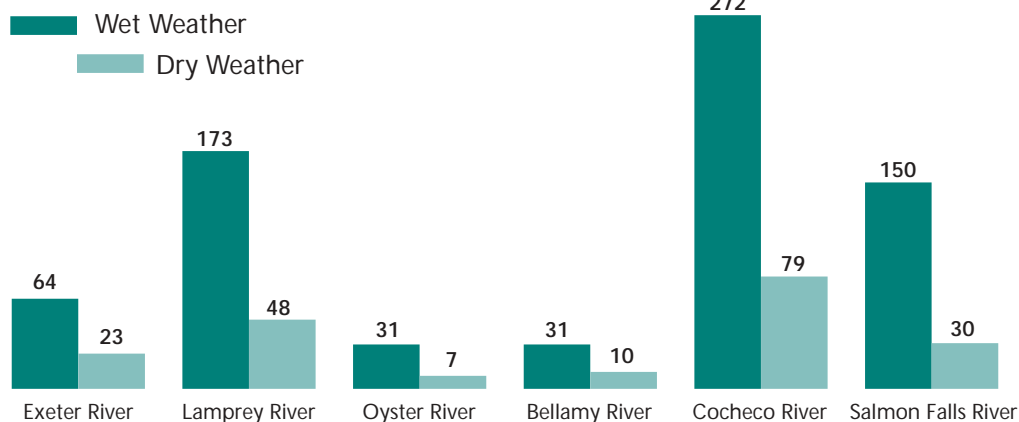
Evidence suggests these sources are prime suspects:

- Runoff from impervious areas
- Illicit connections
- Wastewater treatment system overflows
- Faulty septic systems
- Vessel discharges
- Waterfowl and large bird populations such as pigeons and starlings

Rainfall-related contamination causes closure of shellfish beds to harvesting, as discussed in *Chapter 6: Shellfish Resources*. Potential sources of bacterial contamination near and within New Hampshire's shellfish waters include wastewater treatment facilities effluent, stormdrains, parking lots, roadways, snow dump sites, etc.

## Fecal Coliform in Tidal Water

Fecal coliforms/100 ml



*Geometric mean fecal coliforms in tidal water, collected during dry weather and storm events in tributaries to the Great Bay Estuary: 1993-96.*

*Suspected sources of high wet weather counts in the Cocheco River are illicit connections and leaking sewer pipes.*

## EXCESS NUTRIENTS

Nitrogen is a naturally occurring nutrient essential for plant and algae growth. However, too much nitrogen can ultimately reduce water oxygen levels, with potentially catastrophic consequences for many estuarine creatures. Nutrients in the estuaries come from natural sources such as watershed sediments, wildlife, organic debris (leaves and other vegetation), and groundwater, as well as from point and non-point sources caused by human activity, including atmospheric deposition from power plants, etc. Nitrogen and phosphorus are the two most important nutrients in terms of pollution since they usually have the most impact in aquatic ecosystems. Nitrogen is generally believed to be the nutrient of greatest concern in estuarine and marine waters, although phosphorus has been identified as primary nutrient concern in some situations.

Point sources – primarily municipal and industrial wastewater treatment plants – contribute 41% of nutrient pollutants to the estuaries. Nearly half (48%) of the nutrient loading to Great Bay comes from non-point sources, including urban runoff, stormwater conduits, on-site wastewater treatment (septic) systems, lawn fertilizers, agricultural runoff, and waterfowl and other natural processes. Atmospheric deposition of nitrogenous compounds from the burning of fossil fuels accounts for the remaining 11%. Water contamination from atmospheric deposition is not easily managed. But while non-point sources include nutrients from natural sources, all point source pollution is caused by human activity, and can be managed. Loading from point sources becomes more important for planning for future development and nutrient reduction.

Less is known about nutrient loading in the Hampton-Seabrook Estuary. While point sources and non-point sources of nutrients exist around the Hampton-Seabrook Estuary, the problems associated with nutrient loading are minimized because 80% of the water in the estuary is exchanged with the ocean with each tide cycle.

Excess nitrogen in water can stimulate rapid, unchecked growth of algae and plants, potentially resulting in eutrophication. When such blooms die, their decomposition depletes oxygen in the water, suffocating shellfish and other marine life. All New Hampshire estuaries and their tributaries are subject to nutrient loading, but nutrient concentrations in Great Bay have been largely stable over the last 20 years. No widespread eutrophication has been observed. Isolated incidents of reduced oxygen and phytoplankton (tiny plants that float in water) blooms have occurred in some of the freshwater tributaries of Great Bay – in the impoundments behind the dams at the head of the tide on the Salmon Falls, Cocheco, Oyster, and Lamprey Rivers – and in Portsmouth's North Mill and South Mill Ponds.

EPA-New England, local watershed groups such as the Lamprey River Watershed Association, and the states of Maine and New Hampshire have documented evidence of eutrophication, particularly from point sources, in certain river segments. Total maximum daily load (TMDL) studies of the Salmon Falls River, the Lamprey River below the Epping treatment plant, and the Cocheco River below the Rochester treatment plant have resulted in upgrades to tertiary treatment for the Epping and Rochester WWTFs. Five Salmon Falls River point sources will likely have tighter nutrient limits in their reissued NPDES permits.

While eutrophication and related impacts do not appear to be imminent problems, sources of nutrient contaminants (wastewater treatment effluent, lawn fertilizers, septic systems, and runoff from impervious surfaces) will increase with further population growth and development.



watershed. Other documented sources include oil spills, municipal waste discharges, defense facilities and Superfund sites, stormwater runoff, and groundwater contaminated by hazardous wastes. Numerous oil spills have, to varying extents, adversely affected estuarine life and habitats. Elevated tissue concentrations of toxic contaminants in lobster tomalley, bluefish, and other living resources have caused human consumption advisories, and raise a warning for the whole estuarine system. Toxic levels in sediments are a continuing concern requiring monitoring and risk assessment for activities such as dredging or construction.

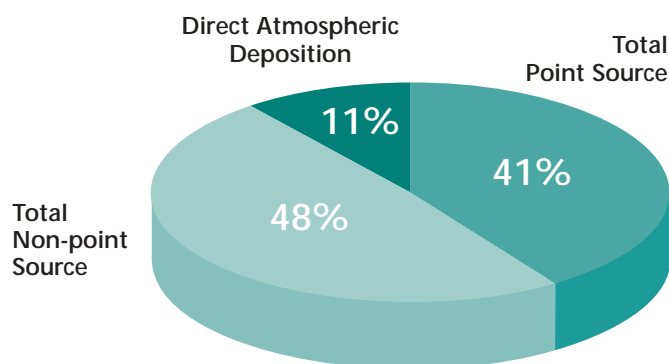
**Nutrients** are continually added to New Hampshire's coastal waters from both natural and human sources. Although nutrient loading occurs in all New Hampshire estuaries and tributaries, no significant change in the nutrient levels of Great Bay has occurred over the last 20 years. No widespread eutrophication—the process by which excess nutrients stimulate excessive algae and plant growth that can deplete oxygen and kill marine life when it decomposes – has been observed. However, intense phytoplankton blooms and reduced oxygen concentrations have occurred as isolated local events in the Great Bay Estuary.

Eutrophication and related impacts do not appear to be imminent threats, but as population and development increase so will sources of nutrient contamination from wastewater treatment facilities, septic systems, lawn fertilizer runoff, runoff from impervious surfaces, and air deposition. The cumulative impacts of these sources could eventually cause nutrient-related problems in the estuaries if current waste treatment technologies and land use plans and regulations continue unchanged. WWTFs are the major source of nitrogen and phosphorus. Strategies to reduce nutrient loading and bacterial contamination from WWTFs are needed to protect water quality in the estuaries, but these will be expensive.

Water quality problems are often the result of large numbers of people in and around the estuaries. People have been and must continue to be part of the solution as well. Outreach and education efforts are the key to many of the actions planned to improve water quality in New Hampshire's estuaries. Many opportunities exist for Seacoast residents to participate in this *Plan* – as homeowners, landowners, business owners and managers, as citizens and taxpayers, as community leaders, municipal and state agency staffers, and volunteers.

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### Sources of Nitrogen Loading to the Great Bay Estuary



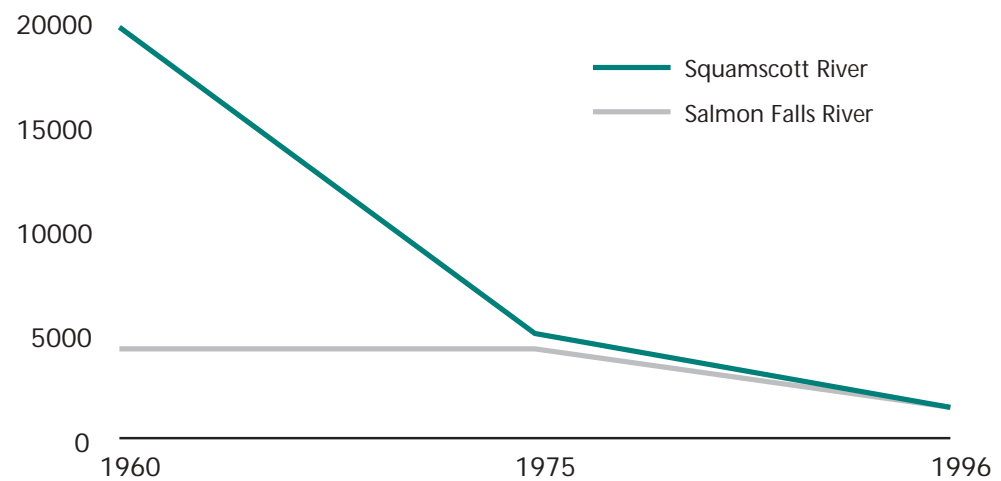


## Wastewater Treatment Systems

Despite significant improvements in recent decades, Seacoast WWTFs still do not meet their required treatment standards 100% of the time. Factors affecting plant performance include storm events, waste stream changes, equipment breakdowns, and operator error. The most severe incidences of bacterial contamination follow rainfall runoff events and treatment process upsets at WWTFs. While dramatic reduction in fecal coliform counts has occurred in tidal rivers like the Squamscott since 1960 due to upgrades required by federal legislation, water quality sampling throughout the Great Bay Estuary tracks a pattern of elevated counts coming from urban runoff and WWTFs. Both routine and storm-related effluent nutrient contribution varies with individual WWTFs. Based on total nitrogen concentrations measured in effluent and

*Total coliforms  
(colonies/100 ml) in the  
Exeter/Squamscott and  
Salmon Falls rivers*

**Total Coliforms 1960-1996**



average effluent volume reported by the plants, the largest nitrogen contributions to the Great Bay Estuary are, in descending order, the Portsmouth, Rochester, Dover, Exeter, Berwick, and Kittery WWTFs.

WWTFs are not the only part of municipal treatment systems that can cause pollution problems. The Seacoast region was the first area of settlement in New Hampshire, and some of the infrastructure in the older cities and towns is old and difficult to replace or maintain. Leaking sewer pipes are suspected in most urban communities. Sewer system maintenance and keeping stormwater and sewage separated are critical to water quality. In addition, projected growth in the region will require increased capacity at some facilities.

Stormwater poses difficulties for several municipal sewage treatment systems in the region. When overburdened by stormwater, facilities bypass pumping stations and discharge inadequately treated sewage directly into tidal waters. Combined sewer overflows (CSOs) have been gradually eliminated from several Seacoast communities. The two remaining CSOs in Portsmouth are significant sources of bacterial contamination to Little and Portsmouth Harbors. Exeter's one remaining CSO is responsible for contaminated water draining into the Squamscott River. Eliminating these last CSOs will be expensive, but would end their storm-related major releases of bacteria

and nutrients into tidal waters. In 1999, Exeter appropriated \$1.7 million to address their CSO problem by 2000.

Stormwater drain systems in several Seacoast towns contain high concentrations of fecal contaminants, even in dry weather, suggesting leaks from sewer pipes or illicit connections of sewage discharging into the storm drains. Many illicit connections have recently been identified and eliminated in Dover and Newmarket.

## **Stormwater**

Stormwater runoff is water from rainfall and snowmelt that runs along the surface of the ground. In an undisturbed natural setting, plant cover slows the movement of stormwater, allowing more time for the water to soak in. Plant roots and organic matter also help absorb and hold water. Thus vegetation allows the soil to act as a natural filter for contaminants, and for plants to take up and use nutrients carried in the water. Slowing the passage of stormwater also reduces its ability to erode soils and deposit them as sediments in surface waters.

Stormwater runoff carries a variety of pollutants. Amounts and types depend on the nature of the precipitation and the surfaces over which the water flows. Building and development replaces naturally vegetated land with hard, impervious surfaces – roads, pavement, roofs, etc. – that cause stormwater from large areas to flow and collect swiftly, accumulating contaminants before it discharges into storm drains and surface waters. This results in increased erosion, flooding, and water pollution. The faster water moves, the more soil is eroded and carried into surface waters as sediment. As more impervious surface covers the landscape, less rainfall is absorbed. Loss of open land reduces buffering of wetlands and surface waters, increasing flooding problems. Stormwater picks up and carries contaminants from vehicles, fertilizers and pesticides, sewers, atmospheric deposition, pets, and industrial and commercial sites, often delivering them directly to nearby surface waters.

Stormwater runoff contaminates New Hampshire's estuarine waters with pathogenic bacteria and viruses, nutrients, sediment, trace metals and other toxins. Runoff from impervious surfaces is a significant source of both trace metal and toxic organic contaminants. Runoff resulting from rainfall and snowmelt events in urban and urbanizing areas is the most common source of bacterial contamination in New Hampshire estuaries. This is due to a combination of inflow and infiltration to sewer pipes, overloaded wastewater treatment plants and combined sewer overflows (CSOs), and non-point source runoff.

Water from rains or melting snow washes contaminants from roadways, parking lots and other paved surfaces, rooftops, construction sites, fertilized lawns, farms, and faulty septic systems into drains, ditches, and tributaries of the estuaries. Contamination from these kinds of diffuse sources is called non-point source pollution. While the U.S. EPA estimates 60% of surface water pollution nationally is non-point related, non-point sources are estimated to contribute 48% of the annual nutrient load to Great Bay. Point sources – primarily municipal wastewater treatment plants – contribute 41%. Continued population growth and development in the coastal region will add more impervious surfaces – paved areas, buildings, etc. – potentially

causing more stormwater-related pollution, as well as adding pressure to WWTFs and sanitary sewer systems.

Stormwater also poses significant problems for municipal sanitary sewer systems. Often stormwater infiltrates old sanitary sewer systems, overburdening pipes, pumping stations, and wastewater treatment facilities. To avoid

damage to the system, operators discharge the excess raw sewage and stormwater volume without treatment. These discharges are referred to as Combined Sewer Overflows or CSOs.

### Other Direct Discharges

In addition to the 18 New Hampshire and three Maine WWTFs, a number of industrial and other plants hold National Pollutant Discharge Elimination System (NPDES) permits for discharges into New Hampshire's tidal waters. Industrial discharge permits include 11 facilities in New Hampshire and three in Maine, two power plants that discharge into the Piscataqua River and Seabrook Station (a nuclear power plant) which discharges into the Atlantic Ocean, and three water treatment plants in the Great Bay Estuary.

Shoreline surveys continue to reveal illegal direct sewage discharges in many areas. Remaining small illegal sewage discharges may be contributing to the high bacterial counts found in many tributaries of the tidal rivers and bays.

### Septic Systems

Many shoreline areas in the more rural and suburban areas around

the estuaries and their tributaries are still served by septic systems. Studies in Seabrook show that septic systems have the potential to contaminate tidal waters when the systems are located close to shore, especially in more densely populated areas with high water tables and coarse, excessively well-drained soils. Seabrook has nearly finished connecting all homes and businesses to their new sewer system. But septic systems are still common along much of the state's tidal shorelines, and failing, poorly maintained, or inadequate systems are a problem.



ANMP

*North Mill Pond,  
Portsmouth*





## REGULATORY AND MANAGEMENT PROGRAMS

### Non-point Source Pollution

Non-point source pollution is all pollution that does not come from a single source or pipe and may be difficult to locate. Much non-point source pollution results from stormwater runoff. **Federal** control of non-point source pollution stems from the Clean Water Act and Coastal Zone Management Act, and focuses on non-regulatory approaches. Amendments to the Clean Water Act in 1987 required states to develop non-point source management programs in order to receive Clean Water Act Section 319 funds.

The 1990 reauthorization of the Coastal Zone Management Act (CZMA) required states receiving CZMA funds to develop coastal non-point source programs. The federal government has approved New Hampshire's program with certain conditions.

Clean Water Act Section 303 (d) and its implementing regulations require states to list water segments that are impaired – defined as out of compliance with a water quality goal or designated use such as swimming or fishing, even after targeted pollution control practices have been implemented to address the problem. The 303 (d) listed waters affecting the New Hampshire estuaries are part of the Cocheco River and the Salmon Falls River downstream of Somersworth. Water bodies on the 303 (d) list are given priority for Section 319 funding to address non-point sources. In December 1999 EPA proposed to apply total maximum daily load (TMDL) reduction targets to non-point sources in 303 (d) listed water segments. This approach is already in effect for point sources in 303 (d) waters.

New Hampshire's **state** non-point source programs are coordinated by a steering committee that includes all state, federal, and local agencies with responsibilities related to non-point sources. NH Department of Environmental Services Water Division is the lead agency, with additional programs under the NH Department of Agriculture, Markets and Food and the NH Department of Resource and Economic Development's Division of Forests and Lands. The NH Office of State Planning, Regional Planning Commissions, and Conservation Districts all help municipalities plan for protection against development-related runoff problems.

New Hampshire's non-point source programs have recently been revised to focus on priority watersheds, including the coastal watershed (the NHEP's study area). New Hampshire's Coastal Non-point Pollution Control Program is coordinated with the state's Clean Water Act Non-point Source Program. NH DES provides financial and technical assistance in addressing the impacts of urban development, septic systems, agriculture, forestry, roads, marinas and boating, hydromodification, and wetlands. The *NHEP Management Plan* is closely linked with the Non-point Source Program because both programs share objectives.

**Local** governments have authority to establish zoning ordinances and development regulations that can give them substantial control over non-point source pollution. Zoning, subdivision regulations, and site plan review may include requirements for stormwater and erosion control, septic design, siting,

and installation. These planning tools may address prohibited land uses, open space requirements, and more. Many towns in the estuarine area use the site plan review process to address post-construction stormwater management.

Zoning overlays may help protect shoreline habitats, wetlands, and other important natural resources from development. Municipalities can also acquire open space lands or conservation easements to protect estuaries and other surface waters or habitats.

The effectiveness of implementation and enforcement of local regulations varies from town to town in the estuarine watersheds. Alone or in combination, these municipal measures contribute to the control and abatement of non-point source pollution provided they are effectively implemented and enforced. All municipalities within NHEP Zone A have established zoning, subdivision, and site plan review processes. The NHEP *Base Program Analysis* found that local natural resource protection regulations and the implementation and enforcement of local regulations vary widely among the towns, often due to community size and staffing differences. Local land use control and its enforcement was found to be a vital link in the protection of New Hampshire's estuaries.

### Point Source Pollution

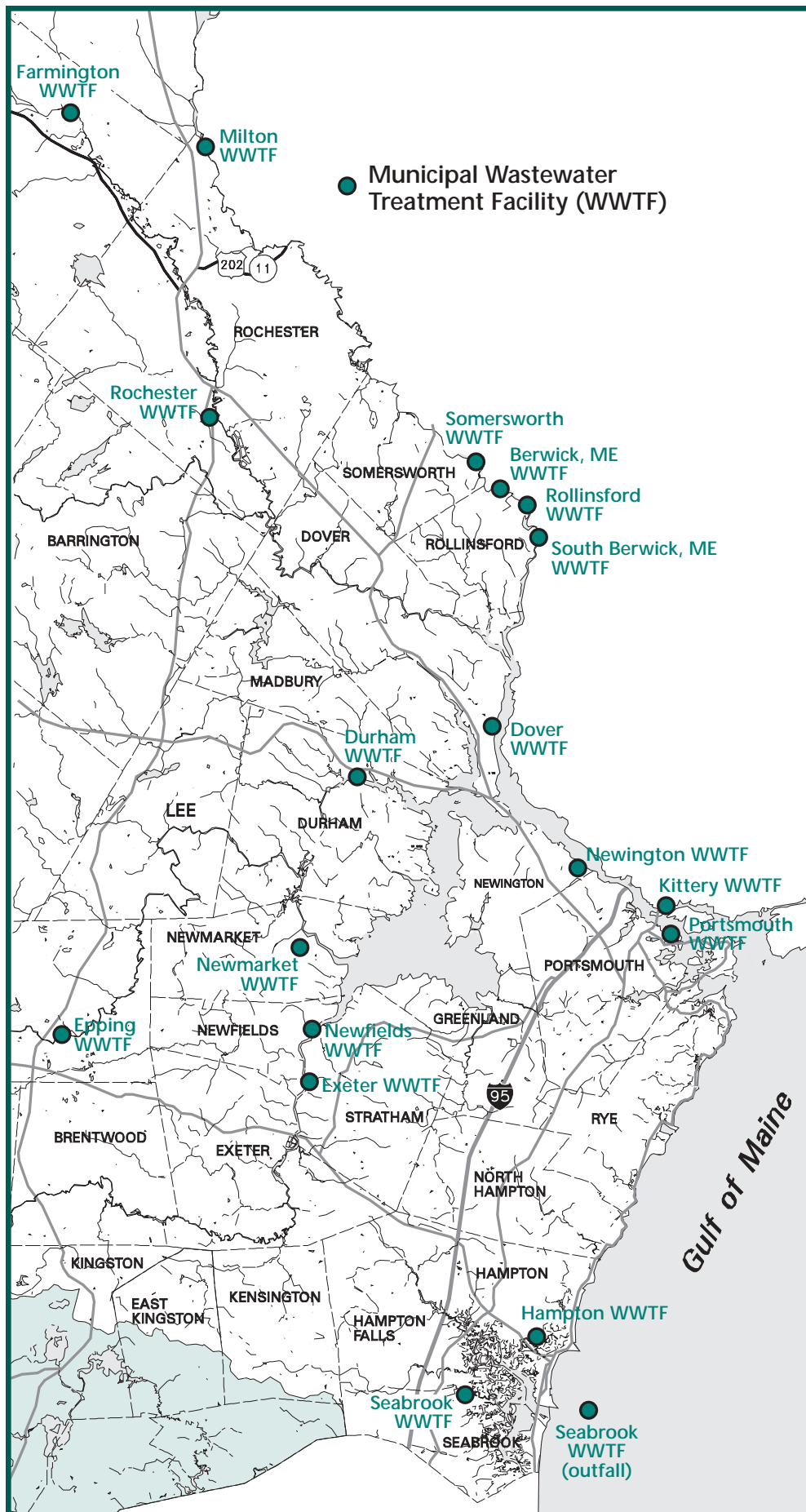
Pollution that is discharged from the end of a pipe or a single readily identifiable source is called point source pollution. This type of pollution includes discharges from industrial and municipal wastewater treatment facilities (WWTFs), and other sources such as drainage ditches. These highly visible sources were the first ones addressed by the Clean Water Act, with dramatic results. However, point source problems persist.

At the **Federal** level, the U.S. Environmental Protection Agency (EPA) regulates point source discharges through the National Pollutant Discharge Elimination System (NPDES) established under the Clean Water Act. Wastewater discharges from all sources require a NPDES permit. The NPDES permit limits the quantity and concentration of pollutants

Rochester Wastewater  
Treatment Facility  
Discharge



NHEP



discharged. Specific requirements depend on the water receiving the effluent, the type of discharge, and may involve best available technology and economic feasibility considerations.

Certain municipal stormwater systems and industrial and construction sites currently require NPDES permits. Under Phase II of EPA's NPDES stormwater management regulations, certain additional stormwater systems that drain into, or are collected by ditches, pipes, or other conveyances before discharging into surface waters, will require NPDES permits by March 2003. Under the current Phase I regulations, construction sites that disturb five or more acres require a NPDES permit, but that threshold drops to one acre under Phase II.

In Phase I, EPA required medium and large municipal separate storm sewer system (MS4) operators – generally those serving areas with populations of 100,000 or more – to obtain permits. While no such MS4s are located in New Hampshire, dischargers of stormwater discharges associated with industrial activity were also required to apply for permits in Phase I. These industrial sources generally include heavy and light manufacturing facilities, hazardous/solid waste processing, recycling facilities including junkyards, mining, timber processing, power plants, vehicle maintenance, sewage/sludge treatment plants, and construction activities that disturb more than 5 acres.

Phase II will regulate small MS4 discharges in urban areas located in 26 municipalities in New Hampshire, stormwater discharge associated with smaller-area construction activity, and the municipally owned industrial activities that were exempted from regulation during Phase I. Small municipal separate storm sewer system (Small MS4) owners and operators in the following New Hampshire Seacoast municipalities will be required to apply for NPDES permit coverage under Phase II: Dover, Durham, Madbury, New Castle, Newington, Portsmouth, Rochester, Rollinsford, Rye, and Somersworth.

As with all NPDES permits in New Hampshire, NH DES will review and certify Phase II NPDES permit applications. The NH OSP is lead agency of a working group recently formed to prepare for the technical assistance communities will need when they begin to address Phase II compliance. Participants include some of the Phase II communities, NH OSP/Coastal Program, NH DES, and NH DOT.

Each NPDES permit requires periodic monitoring and reporting of discharges to EPA and the state. Most Seacoast NPDES permit-holders are on a monthly reporting schedule. NH Department of Environmental Services inspects permitted sites in the Seacoast area at least annually. In the Seacoast, whenever sewage that has not been treated or disinfected is released the operator must notify EPA, NH DES, and all public or privately-owned water systems drawing water from the same receiving water and located within 20 miles downstream of the point of discharge. EPA can enforce NPDES requirements with a range of compliance orders and civil and criminal penalties up to \$25,000 a day and imprisonment. Enforcement actions in response to significant non-compliance and certain by-pass or overflow situations are coordinated between EPA and NH DES.

Clean Water Act Section 303 (d) and its implementing regulations require states to list water segments that are impaired – defined as out of compliance

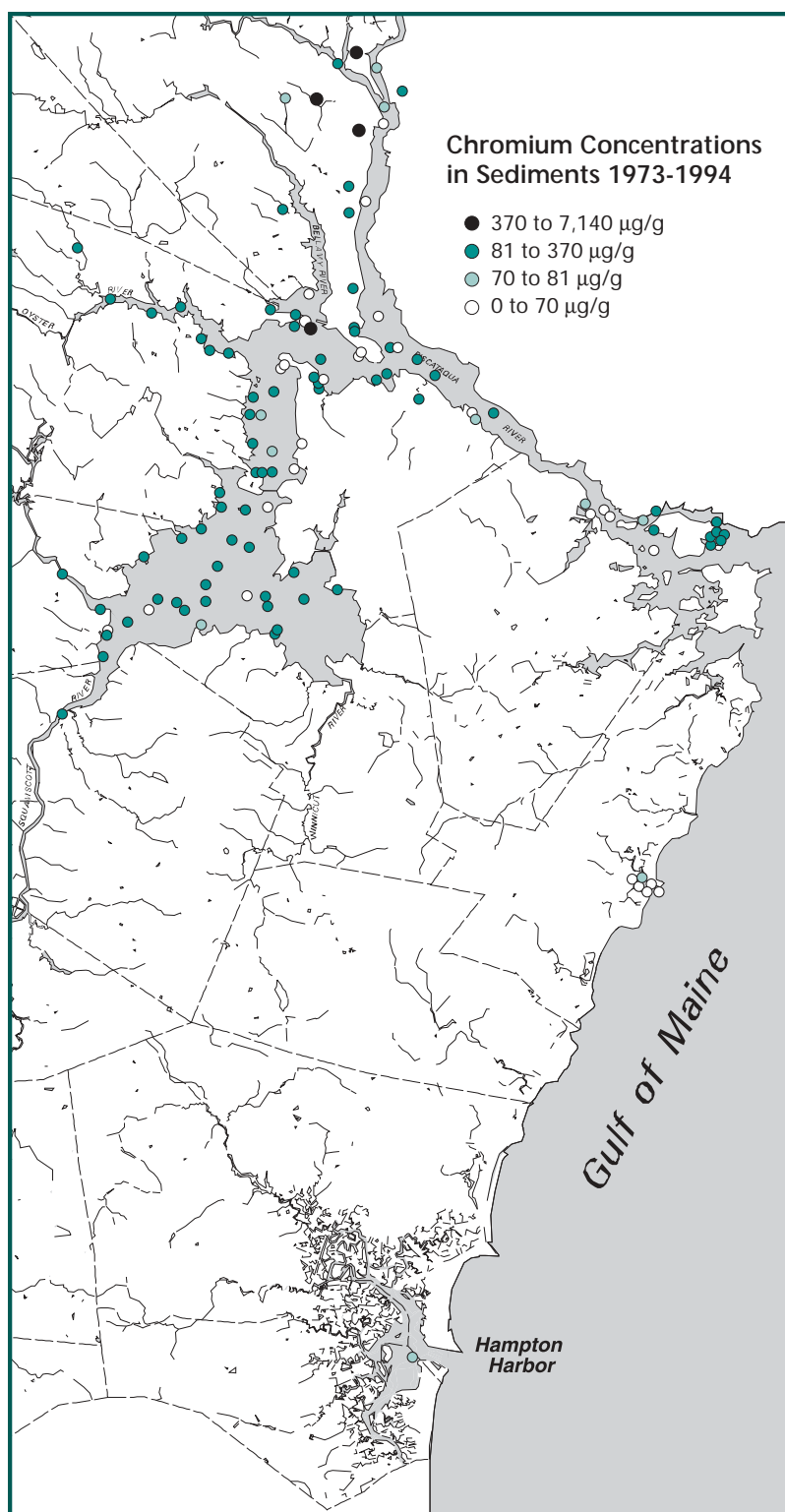




with a water quality goal or designated use such as swimming or fishing, even after targeted pollution control practices have been implemented to address the problem. The Clean Water Act requires that the list include priority ranking of segments most in need of total maximum daily load (TMDL) analysis. The TMDL defines the maximum amount of a specific pollutant that can be discharged into a body of water without violating the water quality goals for that water. NPDES permits and state wastewater discharge licenses are written in accordance with TMDL allocations for the specific water body and source. Permits for five dischargers into the Salmon Falls/Piscataqua rivers in New Hampshire and Maine are currently being developed in accordance with the TMDL for that water. TMDLs are also being developed or implemented for the Cocheco River in Rochester.

The Clean Water Act requires each **state** to establish water quality standards based on water uses and criteria for specific contaminants that are necessary to protect those uses. New Hampshire has established these standards under the state's Water Pollution and Waste Disposal Act (RSA 485-A). NPDES permits establish limits to protect these standards, and require consideration of U.S. Fish & Wildlife Service comments, in accord with the Fish and Wildlife Coordination Act. The Coastal Zone Management Act also requires that federal actions be consistent with state Coastal Zone Management Plans. Under this provision, New Hampshire requirements were incorporated into several federal projects including a hydroelectric facility in South Berwick, Maine and the new interstate gas pipeline which runs through the New Hampshire Seacoast.

NH RSA 485-A makes it unlawful to discharge sewage, industrial, or other wastes in a way that degrades water quality below classification criteria. NH DES can require any person who causes a body of water to be degraded



*Effects Range-Median (ER-M) is the concentration at which biological effects are likely to occur. ER-M = 145µg/g for chromium.*



below the standards of its classification to correct the problem. New Hampshire's standards for bacteria are consistent with the stringent guidelines of the US Food and Drug Administration's National Shellfish Sanitation Program for permitted discharges to tidal waters from wastewater treatment facilities.

Discharge permits must go through both state and federal review. In practice, permittees have two permits, one federal and one state, with EPA incorporating any additional New Hampshire conditions into its permits, and New Hampshire adopting the federal NPDES permits as its own.

**Local** governments have no direct involvement in the NPDES regulatory control for point source discharges. They may comment on NPDES permit applications as part of the public comment process. The local role in pollution discharges is primarily the management of wastewater treatment facilities and stormwater collection systems, and regulations and ordinances to reduce non-point sources that impact stormwater runoff. Municipalities also have some control over industries that discharge into municipal wastewater treatment systems, through their pretreatment programs.

## GOALS FOR CLEANER WATER

To achieve cleaner water in the estuaries, the NHEP established specific goals and objectives with measurable, science-based standards. Refer to *Appendix 3* of the *Plan* for the specific standards for the water quality goals and objectives. Action Plans for water quality detail how specific sources of pollution will be identified and eliminated or reduced to meet these goals:

- Ensure that New Hampshire's estuarine waters and tributaries will meet standards for pathogenic bacteria including fecal coliform, *E. coli*, *Enterococci*, and total coliforms.
- Ensure that New Hampshire's estuarine waters, tributaries, sediments, and edible portions of fish, shellfish, other aquatic life, and wildlife will meet standards for metals, PCBs, oil and grease, PAHs, and other toxic contaminants.
- Ensure that New Hampshire's estuarine waters and tributaries will meet standards for organic and inorganic nutrients, specifically nitrogen, phosphorus, chlorophyll A (freshwater), dissolved oxygen, and biological oxygen demand (BOD).
- Engage the active participation of communities, government agencies, organizations, and individuals in achieving the goals for water quality.

# WATER QUALITY ACTION PLANS

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## Wastewater Treatment Facilities

- WQ-1 Evaluate how Wastewater Treatment Facility effluent affects estuarine water quality, and seek practical options at the state level for secondary and tertiary or alternative treatment where appropriate. 4-17
- WQ-2 Evaluate the suitability of UV alternatives to chlorine in wastewater post-treatment for the Seacoast communities. 4-20
- WQ-3 Prioritize and then upgrade Seacoast wastewater treatment facilities to reduce bacterial pollution from hydraulic overloading. 4-23

## Illicit Connections in Urban Areas

- WQ-4A Establish on-going training and support for municipal personnel in monitoring storm drainage systems for illicit connections. 4-26
- WQ-4B Assist Seacoast communities in completing and maintaining maps of sewer and stormwater drainage infrastructure systems. 4-28
- WQ-4C Eliminate illicit connections in Seacoast communities. 4-31

## Illegal Direct Discharges

- WQ-5 Conduct shoreline surveys for pollution sources. 4-33
- WQ-6 Promote collaboration of state and local officials (conservation commissions, health officers, building inspectors, et al.) to locate and eliminate illegal discharges into surface waters. 4-36
- WQ-7 Provide incentives to fix or eliminate illegal direct discharges such as grey water pipes, failing septic systems, and agricultural runoff. 4-38

## Stormwater

- WQ-8 Research the effectiveness of innovative stormwater treatment technologies for existing urban areas in New Hampshire, and communicate the results. 4-40
- WQ-9 Ensure that water quality and quantity impacts from new development or redevelopment are minimized to the maximum extent practical at the planning board stage of development. 4-43
- WQ-10 Research the use and effectiveness of the Stormwater Management and Erosion and Sediment Control Handbook for Urban and Developing Areas in New Hampshire. Revise, publish, and promote the Handbook. 4-45

## Permitted Discharges

- WQ-11 Revise industrial discharge permit criteria in response to new state processing technology, and re-evaluate existing permits. 4-47

## Oil Spills

- WQ-12A Acknowledge and support the oil spill prevention and response activities of the Piscataqua River Cooperative. 4-49
- WQ-12B Enhance oil spill clean up efforts through pre-deployment infrastructure and development of high-speed current barriers. 4-51

## Septic Systems

- WQ-13 Provide septic system maintenance information directly to shoreline property owners, and to other citizens of the Great Bay and coastal watersheds to help improve water quality. 4-53
- WQ-14 Encourage the use of innovative alternative technologies for failing septic systems to help improve water quality. 4-55

## Air Quality

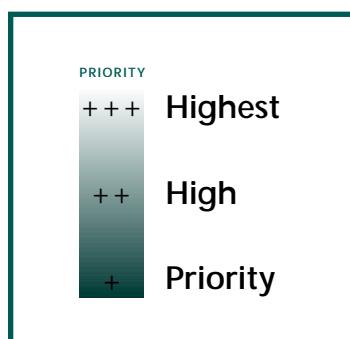
- WQ-15 Support efforts to reduce deposition of atmospheric pollutants through eliminating loopholes in current laws, encouraging the construction of more efficient power plants, and encouraging energy conservation. 4-57

## Water Quality Funding

- WQ-16 Find funding sources for key strategies. 4-59

## Water Quality Outreach

- WQ-17 Coordinate public tours of wastewater treatment facilities. 4-61
- WQ-18 Support and Coordinate Stormwater Technical Workshops. 4-64
- WQ-19 Stormwater Awareness: Support and expand stormdrain stenciling programs. 4-66
- WQ-20 Conduct estuarine field day for municipal officials. 4-68



## ACTION WQ-1

Evaluate how Wastewater Treatment Facility effluent affects estuarine water quality, and seek practical options at the state level for secondary and tertiary or alternative treatment where appropriate.

PRIORITY

WASTEWATER  
TREATMENT  
FACILITY

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### BACKGROUND

Direct discharges from Wastewater Treatment Facilities (WWTFs) are in some cases contributing or major sources of suspended solids and nutrients into surface waters of the state. These pollutants can lead to aquatic nuisance plant infestation and increased incidence of reduced-oxygen concentrations, which can result in habitat degradation, aquatic fauna mortality, algae blooms and eutrophication, and changes to plant and animal communities. These environmental impacts warrant consideration and examination of advanced or alternative wastewater-treatment technologies.

Currently coastal communities evaluate wastewater treatment facilities and infrastructure through the 201 Facility Plans, as required by the EPA. Local officials and operators use these plans in long-term planning for upgrading facilities. Compliance with permit limits varies, but generally coastal wastewater plants meet most or all of their wastewater effluent limits most of the time. Hydraulic overloading is a common occurrence that results in untreated wastewater discharges. Except for Portsmouth, all Seacoast wastewater treatment facilities employ secondary treatment. The Portsmouth facility uses advanced primary treatment, a technology using sand filters to treat effluent.

Although the limited available nutrient data show that nutrients are not at critical levels in most areas of the estuarine systems, EPA, the states of Maine and New Hampshire, and local watershed groups such as the Lamprey River Watershed Association have documented evidence of eutrophication, especially from point sources, particularly at the heads of the tides in the Salmon Falls and Cocheco Rivers. Careful survey of the present effects on flora and fauna is an important part of planning for facility upgrades.

### ACTIONS/ACTIVITIES

- 1 NH DES will hire a contractor to identify WWTF discharges that are probable or potential causes of nutrients and suspended solids impacts throughout New Hampshire's estuaries and tributary rivers. Municipal wastewater plants discharging to tidal waters include: Dover, Durham, Exeter, Hampton, Newfields, Newington, Newmarket, Portsmouth, and Seabrook. Review National Pollutant Discharge Elimination System (NPDES) permits and analyses, and the New Hampshire Estuaries Technical Characterization report.
- 2 The Contractor will conduct biological assessments and look for data gaps in the chemical analyses and biological assessments of surface waters in the potential impact zone. After finding data gaps, conduct follow up wet-weather and dry-weather sampling and analyses. WWTF effluent should be isolated to the extent possible from other point and non-point sources.

- 3 Each wastewater treatment plant determined to be negatively affecting water quality or biological communities will be evaluated by the contractor for design constraints and capacities. This will be the best point to evaluate appropriate upgrade needs for secondary, tertiary, and/or alternative treatment.

Secondary treatment should achieve removal of 85% suspended solids and 85% Biological Oxygen Demand (BOD). Secondary treatment methods may include activated sludge aeration, trickling filters, sequencing batch reactors, and rotating biological contactors.

Tertiary treatment usually aims to remove nutrients such as phosphorus and nitrogen. Phosphorus removal options are ion exchange, sorption, or coprecipitation. Nitrogen removal processes include ammonia stripping and nitrification/denitrification. A new and promising approach is biological nutrient removal.

Constructed wetlands are an alternative treatment for reducing nutrients and common contaminants; however, state regulations discourage use of constructed wetlands to treat wastewater. Commonly cited statistics indicate constructed wetlands can be expected to remove 75% of total suspended solids, 45% of total phosphorus, and 25-35% of total nitrogen.

- 4 NH DES will conduct cost-benefit analyses to evaluate upgrade needs for secondary, tertiary, and alternative treatment. The report of this study would include: review of wastewater treatment plant design with recommendations for changes; review of options, structural constraints, land constraints, engineering and legal planning issues, construction (depends on options), operations and maintenance, and monitoring schedules.
- 5 NH DES will continue to work with municipalities by evaluating the cost-benefit analyses with municipal officials and facility managers.
- 6 NH DES will evaluate monitoring criteria, criteria values, and monitoring frequency required in the permits for any wastewater treatment facilities that install upgrades or other adaptations as a result of this study.

## RESPONSIBLE PARTIES

NH DES would hire a contractor to review available data from permit information and other sources (Step 1). The contractor would proceed with supplemental monitoring, if needed data gaps are identified (Steps 2 and 3). NH DES would use the resulting information to work with municipalities in an effort to upgrade facilities that are having impacts on water quality and biological communities (Steps 4-6).

## IMPLEMENTATION LOCATION

This Action Plan will be implemented in the following communities with wastewater treatment facilities: Farmington, Milton, Rochester, Somersworth, Rollinsford, Dover, Durham, Newington, Portsmouth, Newmarket, Newfields, Epping, Exeter, Seabrook, and Hampton.





## COSTS

Data and information review by contractor in Step 1	\$20,000
Supplemental monitoring in Steps 2 and 3 (field work, analytical testing, and report)	\$50,000
Cost/benefit analysis in Step 4	\$30,000
Information transfer to municipalities in Step 5	\$5,000
Evaluation of permit monitoring criteria in Step 6	\$0
Research and final report in Step 4	\$0
<b>Total</b>	<b>\$105,000</b>

## FUNDING

Possible funding sources would include: State and Federal Revolving Loan Fund under Clean Water Act P3 options, NHEP Implementation Funding, and the Cooperative Institute for Coastal and Estuarine Environmental Technology, or through other Federal programs identified in Tables 10.1 to 10.6 of this document.

## REGULATORY NEEDS

Legislative changes may be needed to clarify the use of artificial constructed wetlands created specifically for pollutant removal, as distinct from naturally occurring wetlands. Wetlands are considered “waters of the state” and as such are entitled to strict water quality protection. Such waters may receive pollutant discharges by permit only and are subject to water quality considerations. They cannot constitute part of the treatment process. All minor permits in the Seacoast have recently been reissued.

## EXPECTED BENEFITS

Upgrades of wastewater treatment plants found to be sources of suspended solids and nutrients will directly improve water quality, flora, and fauna in the zone of effluent impact. Removal of nutrients from the continuous waste stream will reduce the likelihood of internal recycling of nutrients within the estuary.

## MONITORING AND ENFORCEMENT

Additional monitoring may be worked into the NPDES permits to verify the effectiveness of the upgrades.

## TIMETABLE

Initiated by 2005. Opportunities to implement this High Priority action will be pursued in the next four years as funds and resources become available.

### PRIORITY

High Priority. Implementation of this action is not dependent on implementation of other actions listed in the *NHEP Management Plan*.

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## ACTION WQ-2

Evaluate the suitability of UV alternatives to chlorine in wastewater post-treatment for Seacoast communities.

### BACKGROUND

Chlorine is commonly used to disinfect wastewater before final discharge, but chlorine's general toxicity harms aquatic organisms, including shellfish larvae. Dechlorination agents are generally added after disinfection to convert the chlorine to the inert chloride. This further increases the chemical burden in the waste stream, and although less toxic than chlorine, chloride is generally undesirable. Since chemical dechlorination requires little or no infrastructure beyond the existing treatment plant, chemicals are essentially the only cost. The cost (defined as production cost - calculated on the basis of the amortized capital costs, plus the annual operation and maintenance costs, divided by the annual wastewater volume treated by the plant) of chlorination averages \$0.02/1000 gallons, adding dechlorination averages \$0.005/1000. A chlorine plus dechlorination facility for new plant construction averages \$0.03/ 1000. The advantages of chlorine are its low cost and effectiveness on most wastewater, regardless of contents.

The only currently available and practical alternative to chlorine is UV (ultraviolet) disinfection. The waste stream is split into multiple shallow channels and exposed to modest levels of ultra-violet light for just a few seconds. For water that is clear, UV is highly effective, leaves no chemical residue, and effectively kills both bacteria and viruses. UV is also inexpensive, since it requires little space. Energy requirements are low compared to existing WWTF power usage. Long-term costs for UV disinfection are the same as for a retrofitted chlorine plus dechlorination system, \$0.03/1000. Cost in new plant construction is slightly less, \$0.025/1000. While a UV facility takes little space, urban plants with no expansion room may have difficulty adding a UV facility.

The principle disadvantage of UV disinfection is the process's sensitivity to turbidity, the cloudy condition of water with suspended sediments or foreign particles. Turbidity is measured differently from total suspended solids (TSS), and is not always well correlated with measures of suspended solids. There is no plant standard for turbidity, but allowable levels of total suspended solids (TSS) can easily produce turbidity that renders UV disinfection ineffective. Filtration may be required to ensure sufficient clarity. But filtration can have high operation and maintenance costs if, for example, effluent is turbid enough to cause clogging.

The Dover wastewater treatment facility constructed in 1992 has a conventional UV facility. The Environmental Research Group at UNH is studying, with NOAA-CICEET funding, an innovative UV technology called pulsed-UV. This will be piloted in Dover and Durham in 1999 and in 2000. Pulsed-UV holds promise for wastes that are more difficult to treat, e.g. CSOs (combined sewer overflows).

## ACTIONS/ACTIVITIES

The situations under which UV disinfection works are well understood, as are the costs. The following steps are needed to determine if this technique is a suitable alternative to the traditional use of chlorine disinfection.

- 1 Meet with all NHEP study area wastewater treatment plant operators and municipal decision-makers to discuss the detrimental effects of chlorination, and evaluate their interest in post-treatment disinfection alternatives.
- 2 Assess the chlorination/dechlorination products in the post-treatment stream of the major wastewater treatment plants discharging into the estuaries. Review WET (wastewater effluent toxicity) data.
- 3 For plants producing problematic chemical levels, determine if the wastewater turbidity levels will require filtration. For plants that cannot use UV, consider increasing the chlorine detention time as an alternative.
- 4 Determine the cost and benefit for each plant retrofit.
- 5 Present findings to the operators and decision-makers. Work with each municipality to secure funds for construction along with transfer of technical information.

## RESPONSIBLE PARTIES

The lead implementors should be the University of New Hampshire and UNH Cooperative Extension (Steps 1-5). A UNH engineering or marine studies student will perform the assessment of each discharge, evaluate turbidity levels, and do the cost/benefit analysis for each retrofit (Steps 1-4). WWTFs throughout the NHEP study area will be assessed, and NH DES will partner with UNH at each step and work with the municipalities on technical support and to secure funds to implement the recommendations based on priority assignments.

## IMPLEMENTATION LOCATION

This Action Plan will be implemented in those communities with wastewater treatment facilities estuarine watershed selected as appropriate research locations (See list on pages 4-18). Findings and recommendations will be presented across the NHEP study area.

## COSTS

Stipend and expenses for student (conduct assessment, evaluation, and analyses) in Steps 1-4	\$10,000
NH DES involvement (incorporated into existing job tasks) in Steps 1-5	\$0
<b>Total</b>	<b>\$10,000</b>

## FUNDING

This action may be funded through CICEET, US EPA NHEP implementation funds, or through other federal programs identified in tables 10.1 to 10.5 in the *NHEP Management Plan*. State funds available through natural resource management agencies such as NH DES and NH OSP could also support this action. Cash or in kind contributions from Seacoast communities toward the project may also be appropriate.

## REGULATORY NEEDS

Potential changes to NPDES permits.

## EXPECTED BENEFITS

Removal of chlorine from WWTF effluent, with resulting reduction of toxicity to flora and fauna in the receiving waters. An added benefit is the education about and/or elimination of accidental chlorine dumps into the estuary at the facilities switching from chlorine to UV-disinfection. Chlorine is known to kill or harm shellfish and migratory fish, especially the larval forms.

## MONITORING AND ENFORCEMENT

Water samples will be collected by the UNH student during dry and storm conditions following the construction of the retrofits to document the effects on water quality. Selected biomonitoring methods might also be employed to track impacts to aquatic communities.

## TIMETABLE

Initiate by 2005. Opportunities to implement this High Priority action will be pursued in the next four years as funds and resources become available.

### PRIORITY

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High Priority. Implementation of this action is not dependent on implementation of other actions listed in the *NHEP Management Plan*.

## ACTION WQ-3

Prioritize and then upgrade Seacoast wastewater treatment facilities to reduce bacterial pollution from hydraulic overloading.

PRIORITY

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WASTEWATER  
TREATMENT  
FACILITY

### BACKGROUND

Shellfish beds are frequently closed to harvest due to bacterial contamination when wastewater treatment facilities (WWTFs) experience overflows, bypasses and pump problems at the plant or in the distribution system. Both mechanical problems and excess flowage during storm events cause these closures. In addition, Exeter and Portsmouth have combined sewage overflows (CSOs) that discharge untreated sewage and stormwater into surface waters, because of inadequate treatment plant capacity to handle the increased flow during storms. EPA has given both towns administrative orders to fix the CSOs, which are likely to be more stringently enforced in the next couple of years. A multitude of enforcement actions are now being carried out on Seacoast WWTFs. This should make the planning and tracking activities envisioned below appealing to communities.

The key premise of this Action is that each facility has different issues and each community has different WWTF needs. There is no single solution to wastewater issues. Some plants will soon be subject to additional permit requirements, such as limits on phosphorus. All facilities do not contribute equally to wastewater ecological problems. Impacts vary with the frequency and amount of discharge, the affected receiving waters, plant location in the watershed, and treatment process. One option is a pollution tracking system similar to the toxic release inventory, but this may not make sense given the particulars of permit requirements. Plants with more recent permits will have lower pollution limits than older permits. Plants with more recent permits may have violations even when their discharge is significantly cleaner than a facility that is in compliance with an older permit.

This Action is intended to assist NH DES and communities to achieve better treatment of wastewater with a plan that is facility-specific and commensurate with the plants' impacts on the estuaries. The communities and NH DES are working hard to improve WWTF performance, but a regional and long-term planning perspective is needed. This project needs the participation of plant operators and their knowledge of the WWTF systems to succeed.

This Action Plan sets the stage for understanding the "big picture" of wastewater treatment in the estuarine watersheds, prioritizes the problems caused by WWTFs, and recommends how to ameliorate those problems. This project considers future impacts of long-term growth on estuarine water quality. The WWTFs in these watersheds require very large investments to meet performance goals. Most are aging, and operation and maintenance budgets will not be sufficient to upgrade the plants. Carrying out this Action Plan should help communities choose the best way to allocate resources to make upgrades, and build the case for federal or state funding assistance.



## ACTIONS/ACTIVITIES

- 1 Understand the impacts on estuarine water quality of each WWTF that discharges into tidal rivers in the Study Area using the NHEP Technical Characterization report, shellfish program, data from WQ-1, and consultations with the affected communities. (DES, RPCs)
- 2 WWTF Needs Assessment: In collaboration with the affected communities, compile and prioritize the real problems at each plant. Implement upstream and downstream water monitoring if additional data are needed to characterize the receiving waters under various conditions, and to determine the impact of the discharge. Look at all aspects of the plant – inflow/infiltration, pump stations, pipe age, treatment process, plant capacity, CSOs, frequency and amounts of untreated discharge, etc. Examine any plans the town has for improvements or system upgrades. Discuss the problems with the town government and plant operators. Encourage the municipalities to develop contingency plans for mechanical failures. (Consultant)
- 3 Develop a long-term regional plan that includes: plant size and capacity, age of pipes and plants, and contingency planning (e.g., double pumps to avoid bypasses). (DES, RPCs)
- 4 Develop WWTF recommendations and tracking procedure. Communicate plant-specific recommendations to each town. The communities, NH DES, and EPA will develop agreements to fix the problems that result in bacterial loading to the estuary first, then work on other improvements. NH DES and EPA will also work with the communities by providing guidance and technical assistance and tracking successes. Involve the plant operators at every step. (DES, RPCs)
- 5 Prioritize funding for plants based on the recommendations. Assist communities to secure funds to modernize facilities, e.g., State Revolving Fund. (DES, RPCs)

## RESPONSIBLE PARTIES

NH DES is the lead implementer; EPA, Seacoast communities, and Regional Planning Commissions may also assist with this Action. These activities will be undertaken for all facilities identified as important (see Step 1) throughout the NHEP study area. The work will be supported with funding for a coordinator position at NH DES to assist the communities with the planning (Steps 1-5). The coordinator will analyze the *NHEP Technical Characterization* and shellfish program water quality data, and conduct additional water quality analysis as needed. Consultants will be brought in as needed to assist in system analysis (Step 2). The NH DES position should last two years with a mechanism for NHEP or NHCP staff to track progress. Information on the impacts of each WWTF in the ecosystem and the recommendations for each plant should be publicized to increase public support for the necessary improvements.

## IMPLEMENTATION LOCATION

This Action Plan will be implemented in communities with municipal sewage and stormwater infrastructure throughout New Hampshire's estuarine watershed. These include Dover, Durham, Exeter, Hampton, Newfields, Newington, Newmarket, Portsmouth, and Seabrook.



## COSTS

Project coordinator/principal investigator in Steps 1-5

One Full Time Equivalent for two years

(Grade 22 to 24, approx. \$40,000 per year plus benefits) \$110,000

Consulting and engineers in Step 2 \$150,000

Water quality monitoring and equipment in Step 2 \$30,000

**Total \$290,000**

## FUNDING

This action may be funded in part through US EPA NHEP implementation funds or through other appropriate federal programs identified in Tables 10.1 to 10.6 in the *NHEP Management Plan*. State funds available through the State Revolving Loan fund and natural resource management agencies such as NH DES or NH OSP. Communities also have the ability to raise funds for infrastructure improvements by securing municipal bonds authorized at town meeting through the adoption of project specific warrant articles.

## REGULATORY NEEDS

While the initial effort requires no regulatory changes, the implementation phase might. For example, if one part of a WWTF is found to be more of a problem than another, administrative orders may need to be changed to make sure the worst problems are fixed first. More state and federal money may also be needed for upgrades.

The scale, variety and complexity of estuary impacts from municipal wastewater treatment plants in two states (NH and ME, or NH and MA) may warrant the formation of a regional water pollution authority like the Winnepesaukee River Basin Program.

## EXPECTED BENEFITS

This Action will result in a regional plan for improving water quality from WWTFs, with realistic cost estimates to fix WWTF problems, prioritization of problems to help allocate funds, and a time line to make improvements. Despite the high costs of this Action Plan, the potential gains in water quality improvement are significant.

## MONITORING AND ENFORCEMENT

NH DES will conduct additional upstream and downstream monitoring if necessary.

## TIMETABLE

Initiate by 2005. Opportunities to implement this High Priority action will be pursued in the next four years as funds and resources become available.

### PRIORITY

High Priority. Implementation of this action is not dependent on implementation of other actions listed in the *NHEP Management Plan*.

## ACTION WQ-4A

Establish on-going training and support for municipal personnel in monitoring storm drainage systems for illicit connections.

### BACKGROUND

Illicit connections – where non-stormwater pollution discharges into the storm drain systems – are prevalent in New Hampshire urban communities. Illicit connections often result in untreated sanitary sewage flowing through storm drain systems, and discharging untreated into surface waters.

NH Department of Environmental Services is implementing a plan [Coastal Watershed Status Report, December 1995] to identify and eliminate illicit connections in all coastal urban centers. Action WQ-4A will build on information found during investigations by the Department of Environmental Services (NH DES), and will assist municipalities in long-term monitoring of storm drainage systems for illicit connections.

NH DES identified the nine communities targeted for NPDES Phase II regulations (Dover, Durham, Madbury, New Castle, Newington, Portsmouth, Rochester, Rollinsford, and Rye) as well as Hampton and Seabrook as key communities for this activity. Monitoring in the smaller communities of Hampton, Seabrook, Durham, and others may also be desirable.

### ACTIONS/ACTIVITIES

- 1 Form a review board with members from the NHEP, NH DES, NHCP, and municipal officials from the key communities listed above, to review the results of the investigations and discuss their challenges in finding and eliminating illicit connections. Review the completed and on-going investigations by NH DES to determine where major problems are located.
- 2 NH DES and OSP/NHCP will train municipal staff in investigatory techniques for identifying illicit connections and enforcement options for ongoing investigations.
- 3 Municipalities will work with NH DES to develop and maintain an illicit connections database of the storm drainage system, and include this in the operations budget.
- 4 The review board will create local monitoring plans based on the NH DES investigative techniques (e.g. bacterial monitoring, smoke and dye testing). Identify funding sources including loans and grants such as the State Revolving Fund, Clean Water Action Plan, Non-point Source Program (NPS), and the Community Development Block Grant (CDBG) as incentives for the communities.
- 5 NH DES and NH OSP/NHCP will work with municipalities to identify resource needs for water quality monitoring of storm drain outfalls.
- 6 Assist communities with securing funds to monitor storm drainage systems as an additional incentive to participate in this training program.



## RESPONSIBLE PARTIES

The New Hampshire Department of Environmental Services may be the lead implementer of this action with assistance from the New Hampshire Office of State Planning and the New Hampshire Coastal Program and coastal community public works departments.

## IMPLEMENTATION LOCATION

This Action Plan will be implemented in key communities such as Portsmouth, Dover, Rochester, Newmarket, Somersworth, and Exeter. Scaled-back monitoring in the smaller communities of Hampton, Seabrook, Durham, and others may be desirable locations for implementation of this Action Plan.

## COSTS

Review of current status and training:

Coordinate review board in Step 1	\$0
Meetings with communities (supplies, copies, etc.) in Step 1	\$500
Training in Steps 2-6 (development, materials, AV equipment, etc.)	\$10,000

**Total** **\$10,500**

Monitoring program for 11 communities: water quality

monitoring of storm drainage outfall pipes in Step5

and smoke and dye testing (as needed) in Steps 2-4 (per town) \$5,000

**Total** **\$55,000**

Note: Costs for fixing illicit connections are shown in Action WQ-4C.

## FUNDING

This action will be funded through US EPA NHEP implementation funds in 2001 and 2002. Future work may be funded through federal programs identified in Tables 10.1-5 in the *NHEP Management Plan*. State funds available through natural resource management agencies such as NH DES and NH OSP could also support this action. Possible funding sources include loans and grants such as the State Revolving Fund, Clean Water Action Plan, Non-point Source Program (NPS), and the Community Development Block Grant (CDBG).

## REGULATORY NEEDS

None identified.

## EXPECTED BENEFITS

Implementation of this action will result in increased awareness of illicit connections and improvement of surface water quality.

## MONITORING AND ENFORCEMENT

NH DES will oversee the development of local monitoring plans. This action should result in increased local enforcement of illegal sewer hook-up laws and ordinances.

## TIMETABLE

Initiate in 2001. Complete for Phase II communities, Hampton, and Seabrook by 2002. This Highest Priority action is expected to be implemented in the first four years of *NHEP Management Plan* implementation.

### +++ PRIORITY

Highest Priority. Implementing Action WQ-4B before or concurrently with this action may be desirable.

## ACTION WQ-4B

Assist Seacoast communities in completing and maintaining maps of sewer and stormwater drainage infrastructure systems.

### BACKGROUND

While some communities have adequate infrastructure maps, many have incomplete maps or none at all. Investigations into illicit connections to storm drains have demonstrated the importance of accurate sewer and storm drain systems maps. Maps are also valuable for emergency response to events such as oil spills on roadways. In larger communities such as Dover, Exeter, Newmarket, Portsmouth, Rochester, and Somersworth, maps also play a key role in long-term infrastructure planning. These communities and NH Department of Transportation can serve as partners in this action.

Most of the urbanized areas of the Seacoast region, including Dover, Durham, Madbury, New Castle, Newington, Portsmouth, Rochester, Rollinsford, Rye, and Somersworth, will be required to map all their stormwater conveyances as part of their development and implementation of stormwater management programs required under Phase II of EPA's NPDES stormwater management program.

While wastewater treatment plants and pump stations are important to the protection of water quality, the sewerage infrastructure that carries waste to these destinations must also be maintained. Recent repair work in one coastal community revealed old pipes made from bored logs. Infrastructure maps would assist communities in long-term planning for replacement and maintenance of underground pipes, as well as with master plan development. This Action Plan will help communities prepare for Phase II stormwater management NPDES permit regulations, which will require permits for small municipal separate stormwater system discharges by March 2003.

### ACTIONS/ACTIVITIES

- 1 Regional planning commissions (RPCs) will hire staff (funded by NH DES) to determine the availability and completeness of infrastructure maps for all municipalities with sewer and storm drain infrastructure. Review of completeness will include map type, accuracy, and additional needs. Other information should be obtained from utilities (GIS layers).
- 2 RFCs will verify existing infrastructure and map the systems in areas where information gaps exist. Investigate the possibility of using geomagnetic survey equipment to locate underground pipes.
- 3 RPCs will digitize the gathered information and create data layers on a GIS system, along with natural drainage features, roadway, and utility data layers.
- 4 Municipalities perform field checks of the final maps, and RPCs make any necessary corrections.





- 5 Once the data layers are completed, the RPCs could provide a workstation for municipalities as needed to access the data, or pass the information on to communities that have appropriate hardware and software.
- 6 Train municipal staff to access the information and create data layers through the University of New Hampshire's Community Mapping: A GIS Course for Educators, Community Leaders, and Other Interested Persons, provided by UNH Cooperative Extension.

## RESPONSIBLE PARTIES

NH DES and the Regional Planning Commissions would partner as lead coordinators for this action (Steps 1-5). The affected coastal communities, and perhaps also the NH Department of Transportation, should be included in this effort. UNH Cooperative Extension will provide GIS Course (Step 6).

## IMPLEMENTATION LOCATION

This Action Plan will be implemented in communities with municipal sewage and stormwater infrastructure such as Dover, Durham, Madbury, New Castle, Newington, Portsmouth, Rochester, Rollinsford, and Rye. Mapping will be completed in all those communities identified as needing maps.

## COSTS

Costs per municipality:

0.5 staff time for three years in Steps 1-4	\$30,000
Meeting with municipalities	
Researching and obtaining additional data layers	
Digitizing and creating data layer	
Field supplies and equipment in Steps 1-4	\$ 5,000
Geomagnetic survey equipment and training in Step 2	\$ 5,000
Surveys of sewer and storm drainage systems in Step 2	\$120,000
<b>Total</b>	<b>\$160,000</b>

Other costs for RPCs over 3 years

Transferring information to municipalities in Step 5	\$ 1,000
Training municipal staff/Participation in GIS course in Step 6	\$ 5,000
Setting up a workstation at each RPC office in Step 5	\$12,000
<b>Total</b>	<b>\$18,000</b>

## FUNDING

This action may be funded through US EPA NHEP implementation funds, or through other federal programs identified in tables 10.1 to 10.5 in the *NHEP Management Plan*. State funds available through natural resource management agencies such as NH DES and NH OSP will also support this action. Costs per town may vary substantially.

## REGULATORY NEEDS

None identified.

## EXPECTED BENEFITS

Maps will provide much needed information to municipalities and NH DES for investigations of illicit connections, saving staff time and equipment costs. Use of the maps for emergency response planning and long-term infrastructure planning and maintenance will help protect water quality.

## MONITORING AND ENFORCEMENT

Not applicable.

## TIMETABLE

This Highest Priority action is expected to be implemented by 2004.

## PRIORITY

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Highest Priority. Completion of this action before or concurrently with implementation of Action WQ-4A is desirable.

## ACTION WQ-4C

Eliminate sewer and storm drain illicit connections in Seacoast communities.

PRIORITY

+++

ILLICIT  
CONNECTIONS

### BACKGROUND

Illegal direct discharges represent the majority of the remaining point sources of pollution contaminating surface waters in the NHEP study area. These are significant – but preventable – sources of bacteria and nutrient loading throughout the estuaries and coast. Immediate improvements in water quality have resulted from eliminating sanitary wastewater discharges connected to the storm drainage system instead of the municipal sewer system. These discharges are commonly referred to as illicit connections.

Action WQ-4C will build on work to identify sources conducted in WQ-4A (training to monitor storm drain systems for illicit connections). Action WQ-7 (incentives to fix or eliminate illegal discharges) provides tools to work with owners of direct discharges and municipalities by assisting them with funding to fix illicit connections. Significant incentives are needed to reach compliance. The State Revolving Fund is one possible funding source. Key communities for this activity include Portsmouth, Dover, Rochester, Newmarket, and possibly Somersworth.

This Action Plan will help communities prepare for Phase II stormwater management NPDES permit regulations, which will require permits for small municipal separate stormwater system discharges by March 2003.

### ACTIONS/ACTIVITIES

- 1 Create a database template for municipalities to collate information obtained in the storm drainage system investigations (NH DES). Municipalities need to purchase software to use the template. Where possible, useful, and financially feasible, regional planning commissions can assist communities in exporting data to a mapping program to create an additional layer to track progress in eliminating direct discharges (see Action WQ-4B).
- 2 The NH Department of Environmental Services will assist municipalities in prioritizing and scheduling the removal of illicit connections identified by NH DES investigations and through WQ-4A.
- 3 Help municipalities obtain loan and grant funds to eliminate illicit connections (See WQ-7 for further information).
- 4 Municipalities and business and home owners remove illicit connections from the storm drainage system, and connect to the municipal sewer system.
- 5 Use background data obtained from Action WQ-4A to continue monitoring and documenting water quality improvement after eliminating illicit connections. Local watershed associations, such as Great Bay Coast Watch and the Cocheco River Watershed Coalition, will assist in follow-up monitoring.

## RESPONSIBLE PARTIES

Coastal municipalities and NH DES will partner as lead implementers with assistance from the Regional Planning Commissions.

## IMPLEMENTATION LOCATION

This Action Plan will be implemented in communities with municipal sewage and stormwater infrastructure such as Dover, Durham, Madbury, New Castle, Newington, Portsmouth, Rochester, Rollinsford, and Rye.

## COSTS

Per community:

Purchase of database software in Step 1	\$400
RPC personnel time to assist with data layer of illicit connections in Step 1	\$2,000
Annual maintenance budget for illicit connections fixes in Steps 2-4 (assumes 10 fixes per year @ \$6,000 per fix)	\$60,000
Long-term water quality monitoring of storm drainage system (annual cost) in Step 5	\$ 2,000

**Total** **\$64,400**

## FUNDING

This action may be funded through US EPA NHEP implementation funds or through other federal programs identified in Tables 10.1 to 10.5 in the *NHEP Management Plan*. The State Revolving Fund is one possible funding source. State funds available through natural resource management agencies such as NH DES and NH OSP will also support this action. Local match for fixes will help support removal of illicit connections (Steps 2-4).

## REGULATORY NEEDS

Not applicable.

## EXPECTED BENEFITS

Eliminating raw sewage discharges from storm drainage systems will yield nearly immediate improvements in water quality, as these pipes flow directly into estuarine and coastal surface waters.

## MONITORING AND ENFORCEMENT

The state of New Hampshire has regulations governing illicit connections, and NH DES uses a strategy of working with municipalities to identify and correct such connections. Post-fix monitoring will be conducted to document improvement in water quality and monitor storm drainage systems for illicit connections.

## TIMETABLE

This Highest Priority action will be initiated in 2001. Twenty fixes will be funded in 2001 and 2002..

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### PRIORITY

Highest Priority. This action most effectively follows implementation of WQ-4A, WQ-4B, and WQ-7.



## ACTION WQ-5

Conduct shoreline surveys for pollution sources.

PRIORITY

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ILLEGAL  
DIRECT  
DISCHARGES

### BACKGROUND

Most industrial point source discharges have been eliminated or are closely monitored through state and federal permitting programs. But many older, non-industrial, illegal discharges continue to pollute sensitive estuarine waters. This Action outlines steps for cost-effective surveys to identify such discharges, using traditional sanitary surveys for shellfish growing areas and using similar methods in areas not designated as shellfish growing areas.

The goal of this long-term, dynamic action is protecting human and ecological health. These surveys are an educational and service opportunity for students and other volunteers, with training. Shoreline surveys will aid in eliminating illegal discharges, and in raising public awareness of pollution issues and solutions. This Action Plan will help communities prepare for Phase II stormwater management NPDES permit regulations, which will require permits for small municipal separate stormwater system discharges by March 2003.

Many shellfish growing areas in the NHEP study area have been surveyed and classified by the Department of Health and Human Services. The remaining unclassified areas are scheduled for sanitary surveys over the next five years by the NH DES shellfish sanitation management program. (NH DES has completed storm drain investigations in all urban coastal communities except Portsmouth and Rye, which are scheduled for 1999 and 2000.) The National Shellfish Sanitation Program (NSSP) requires routine shoreline surveys every three years for all shellfish growing waters, but once an initial shoreline survey for pollution sources is completed, subsequent surveys review only new development. The FDA requires a full sanitary survey every 12 years for shellfish waters, with a less intensive survey every three years.

### ACTIONS/ACTIVITIES

- 1 NH DES and volunteers conducts surveys using existing protocols published by the Food and Drug Administration with the Interstate Shellfish Sanitation Conference.
- 2 Gather existing survey information collected by watershed associations, conservation commissions, conservation districts, community health officers, and other groups. (NH DES)
- 3 Use existing shoreline survey/sanitary survey database to manage survey results and coordinate with mapping programs. Explore opportunities for involving UNH students, docents, and watershed organization volunteers to enter data. (NH DES)
- 4 Seek volunteers from such groups as students, conservation commissions, watershed associations and other organizations to assist with surveys. (NH DES)



- 5 Use the volunteer training program developed by the Great Bay Coast Watch to train teams and/or team leaders to conduct surveys. Great Bay Coast Watch has successfully assisted the NH Coastal Program and the Department of Health and Human Services in several shoreline surveys, and their program should be the model for other organizations that join this effort. Survey leaders should participate in FDA training opportunities.
- 6 Delineate the entire area to be surveyed (as directed by the Sanitary Survey schedule) and divide the project into zones or other sub-units. (NH DES)
- 7 Train and assign volunteer groups to geographic units to conduct surveys. (NH DES and Great Bay Coast Watch)
- 8 Notify shorefront property owners, town conservation commissions, and health officers of impending surveys. (NH DES)
- 9 Conduct surveys. (NH DES, NHCP, NHEP, volunteers)
- 10 Enter survey results in the NH DES database and coordinate with mapping programs. (NH DES)

## RESPONSIBLE PARTIES

NH DES will be responsible for completing the sanitary surveys, including shoreline surveys of shellfish growing areas in tidal waters and entering results in the DES database (Steps 1-10) (see Action SHL-1). The New Hampshire Coastal Program and the New Hampshire Estuaries Project outreach coordinator will assist with the shoreline surveys (Step 9). The NH DHHS will continue to provide technical assistance on human health-related shellfish questions. Great Bay Coast Watch and other volunteer organizations may also assist with conducting surveys. (Steps 4, 5, 7, and 9).

## IMPLEMENTATION LOCATION

See shoreline survey schedule on pages 6-14 for locations and dates.

## COSTS

Per Season:

Training for survey leaders in Step 5	\$200
Volunteer training in Step 7	\$1,000
Volunteer organization support in Step 5	\$7,500
Printing for forms, postage, and telephone follow-up in Steps 1-10	\$200
Data entry (if not performed by students/volunteers) in Step 3	\$200
Reporting to NH DES in Step 10	\$500

**Total** **\$9,600**



## FUNDING

This action will be funded in 2001 and 2002 with US EPA NHEP implementation funds. Ongoing support for this action will be re-evaluated after 2002. State funds available through natural resource management agencies such as NH DES and NH OSP may also support this action.

## REGULATORY NEEDS

None identified.

## EXPECTED BENEFITS

Expected benefits include: identification of pollution sources, especially those with direct impacts on water quality; collection of current data in a format usable with mapping programs; program design and data management that can be easily updated; and increased public awareness and participation.

## MONITORING AND ENFORCEMENT

None identified.

## TIMETABLE

This Highest Priority action will be implemented in 2001 and 2002.

## PRIORITY

+++

Highest Priority. Implementation of this action is not dependent on implementation of other actions listed in the *NHEP Management Plan*. It is related to the implementation of the NH Shellfish Sanitation Program outlined in Action Plan SHL-1.

## ACTION WQ-6

Promote collaboration of state and local officials (conservation commissions, health officers, building inspectors, and others) to locate and eliminate illegal discharges into surface waters.

### BACKGROUND

While WQ-5 addresses identification of illegal discharges into shellfish growing waters of the estuaries, WQ-6 addresses all other shoreline areas of the NHEP study area, primarily those in Zone B and non-tidal portions of Zone A.

Efforts to identify and resolve pollution problems are most effective when state and local officials (building inspectors, health officers, conservation commission members, public works staff, and others) collaborate. This Action Plan aims to encourage local officials to share their knowledge with NH DES and others conducting pollution source surveys. This Action Plan will help communities prepare for Phase II stormwater management NPDES permit regulations, which will require permits for small municipal separate stormwater system discharges by March 2003.

### ACTIONS/ACTIVITIES

- 1 NH DES and NHEP develop a public awareness campaign including posters, training programs/workshops, direct mail, and other communication tools to explain procedures for reporting suspected pollution sources. Offer the option of holding workshops for individual communities during regularly scheduled meetings.
- 2 NH DES staff will respond promptly to new and increased reporting, and provide follow-up communication to reporting groups.
- 3 NH DES will investigate and address the reported illegal discharges.
- 4 NH DES and NHEP create and distribute a community-by-community status report to inform all parties of the actions and results.

### RESPONSIBLE PARTIES

The New Hampshire Department of Environmental Services would be the lead implementer of this action with outreach assistance from NH Coastal Program and NHEP. (Step 1-4)

### IMPLEMENTATION LOCATION

This Action Plan will be implemented in all 43 communities in New Hampshire's estuarine watershed. Emphasis may be placed on the 19 NHEP Zone A communities (17 towns with tidal shoreline plus Rochester and Somersworth).

## COSTS

0.5 NH DES staff for program development and follow-through of complaints in Steps 1-4	\$20,000
Promotional materials and mailings in Step 1	\$5,000
Inspection budget in Steps 2 and 3	\$5,000
Status report production and mailing in Step 4	\$2,000
<b>Total</b>	<b>\$32,000</b>

## FUNDING

This action may be funded through US EPA NHEP implementation funds or through other federal programs identified in tables 10.1 to 10.5 in the *NHEP Management Plan*. State funds available through natural resource management agencies such as NH DES and NH OSP could also support this action.

## REGULATORY NEEDS

None identified.

## EXPECTED BENEFITS

Cooperation and communication between NH DES and municipalities will lead to identification of sites unknown to regulatory government agencies, thus reducing illegal discharges and improving estuarine water quality.

Building good relationships with the local communities will establish trust between local officials and NH DES.

## MONITORING AND ENFORCEMENT

Water quality monitoring, enforcement, and development of a town-by-town status report are all integral to this action.

## TIMETABLE

Initiate by 2005. Opportunities to implement this High Priority action will be pursued in the next four years as funds and resources become available.

### PRIORITY

++

High Priority. Implementation of this action is not dependent on implementation of other actions listed in the *NHEP Management Plan*.

## BACKGROUND

## ACTION WQ-7

Provide incentives to fix or eliminate illegal direct discharges such as grey water pipes, failing septic systems, and agricultural runoff.

After illegal discharges are identified through action WQ-6, a multi-level strategy to fix or eliminate them should begin to remove the threat to water quality and public health. This action should identify funding sources and other incentives, including loans and cost-share programs, for property owners to fix or eliminate their discharges. This action is intended to help property owners with illegal direct discharges achieve compliance with water protection laws. This action will help communities prepare for the Phase II stormwater management NPDES permit program, which will require permits for small municipal separate stormwater system discharges by March 2003.

### ACTIONS/ACTIVITIES

- 1 Identify sources of financial and technical assistance, and review information on pertinent regulations and related policies in the NHEP Base Program Analysis. Provide this information as an incentive for owners or responsible parties to remedy illegal direct discharges. The NH Department of Environmental Services, the University of New Hampshire, USDA/NRCS, and the Office of State Planning/Coastal Program will collaborate with NHEP, using existing information and directories where possible.
- 2 The Department of Environmental Services should be encouraged to market State Revolving Fund loans to municipalities, for the purpose of making incentive loans to property owners with failing septic systems. US Department of Agriculture funds may be available for agricultural sites to eliminate direct discharges.
- 3 NHEP will create and regularly update a printed and online directory listing current financial assistance opportunity information targeted to fixing direct discharges. The directory should be easily updated in both print and online formats, and be included with all notices to property owners of illegal discharges.
- 4 NHEP will create a database listing owners of direct discharges using information from sanitary surveys, shoreline surveys, and other reported discharges (including data generated through Action WQ-5).
- 5 NHEP will send the funding directory to owners of direct discharges, and offer technical assistance and referrals for the application and design process to remedy the problem.
- 6 NHEP will, concurrently with Step 5, develop case studies of success stories, with referrals from successful projects, to encourage cooperation. Use success stories for press releases and to maintain good media relationships.



## RESPONSIBLE PARTIES

NHEP is the lead implementer (Steps 1-6) with assistance from NH DES, NRCS and NHCP, develops the directory for distribution by NH DES, county conservation districts, UNH Cooperative Extension, NRCS, and others.

## IMPLEMENTATION LOCATION

This Action Plan will be implemented in all 43 communities in New Hampshire's estuarine watershed. Emphasis may be placed on the 19 NHEP Zone A communities (17 towns with tidal shoreline plus Rochester and Somersworth).

## COSTS

NHEP staff in Steps 1-6	\$0
Printed and on-line directory development in Step 3	\$3,000
Production, printing, and mailing costs in Steps 3, 5, and 6	\$7,000
Development of discharge database in Step 4	\$2,000
Mailing costs in Step 5	\$500
<b>Total</b>	<b>\$12,500</b>

## FUNDING

This action may be funded through US EPA NHEP implementation funds, or through other federal programs identified in Tables 10.1 to 10.5 in the *NHEP Management Plan*. State funds available through natural resource management agencies such as NH DES, and NH OSP could also support this action.

## REGULATORY NEEDS

None anticipated when the efforts resulting from this action are successful. In cases where the landowner has been uncooperative or refused to make appropriate changes, the appropriate existing environmental enforcement procedures should be initiated.

## EXPECTED BENEFITS

This action should not only result in the elimination of illegal discharges, it should also build an awareness of this threat to water quality, not only to owners, but to the general public.

An additional benefit would be generation of success stories to publicize, and case studies to assist with public relations and additional projects.

## MONITORING AND ENFORCEMENT

- Work with the property owner or oversight agency to assure that any grant funding contractual obligations are met.
- Assure that action has been taken and properly implemented. Water quality monitoring should be undertaken to determine impaired and recovery conditions.

## TIMETABLE

This Highest Priority action will be implemented in 2001 and 2002.

### +++ PRIORITY

Highest Priority. Implementation of this action will greatly enhance implementation of many other Action Plans.

## ACTION WQ-8

Research the effectiveness of innovative stormwater treatment technologies for existing urban areas in New Hampshire, and communicate the results to developers and communities.

### BACKGROUND

Urban stormwater carries pathogens, sediment, nutrients, heavy metals, and other contaminants. Pro-active planning goals to reduce stormwater impacts include minimizing impervious surfaces and maximizing vegetated areas. Stormwater from paved surfaces in developed urban centers can degrade downstream waters with both contaminants and increased volumes of water. Various technologies have been used to reduce the large peak flows, with mixed success. Innovative stormwater treatment technologies designed specifically for large impervious areas are now available. Mostly designed for subsurface installation, these urban retrofits take less space than conventional methods to treat stormwater before it drains to surface waters.

CICEET-sponsored researchers at the University of New Hampshire are testing the effectiveness of traditional technologies for managing both the quantity and quality of stormwater. Research results will be available in 2000 to corroborate continued use of effective stormwater treatment and control methods, and to help discontinue the use of methods that are not effective, or even worse, contribute pollutants.

Traditional techniques may be preferable, but are not always practical for treating stormwater. Lack of space for natural solutions is often a problem in urban centers, making innovative retrofits a potentially attractive alternative. Confirming treatment effectiveness of retrofits in New Hampshire urban areas is most important, and must be closely examined relative to the cost of installation and maintenance requirements. By March 2003 EPA will require Phase II NPDES stormwater management permits for discharges from small municipal separate storm sewer systems, and from construction sites disturbing between one and five acres. Post-construction stormwater management in new development and redevelopment must also meet Phase II requirements.

### ACTIONS/ACTIVITIES

- 1 The NHEP outreach coordinator and/or NH Department of Environmental Services will spearhead a partnership among the University of New Hampshire, NH DES, the Office of State Planning/Coastal Program, the NH Estuaries Project, conservation districts, the UNH/NOAA Cooperative Institute for Coastal and Estuarine Environmental Technology (CICEET) and USDA/NRCS to find and collate existing research and manufacturer information on innovative stormwater technologies (retrofits for water quality and quantity management).
- 2 This ad hoc group will use the published third-party information gathered and provide this to developers and communities to assist them in selecting the best available treatment retrofits.



- 3 NH DES will monitor the effectiveness of the two stormwater treatment facilities that will be constructed in Hampton and Seabrook in 2000. Each facility will have a retrofit unit within the treatment system.
- 4 Ad hoc group from Step 1 will organize and schedule workshops and demonstrations to show the successes and challenges of these two facilities. One of these events could be held in conjunction with industry trade shows.
- 5 Ad hoc group will develop a 'driving tour booklet' of stormwater facility sites in Zone A and B, including design specifications and water quality data for each site. Distribute the booklet to local governments, trade organizations, and to stormwater trade show attendees.

## RESPONSIBLE PARTIES

NH DES (Steps 1-5), NHEP, OSP/NHCP, UNH, USDA Natural Resource Conservation Service, county conservation districts, UNH/CICEET (research and outreach programs) and RPCs for creation and distribution of the information (Steps 1, 2, 4, 5).

## IMPLEMENTATION LOCATION

This Action Plan will be implemented in the 43 communities in New Hampshire's estuarine watershed. Findings and recommendations will be presented across the NHEP study area.

## COSTS

Research third party water quality data that pertains to the retrofits in urban communities in Step 1	\$5,000
Collation of materials in Step 2	\$2,000
Water quality monitoring at two retrofit sites in Step 3	\$55,000
Workshops and demonstration events in Step 4	\$10,000
Development of the driving tour booklet in Step 5	\$5,000
Distribution and promotion of driving tour book in Step 5	\$5,000
<b>Total</b>	<b>\$77,000</b>

## FUNDING

Step 3 (monitoring) will be funded with US EPA NHEP implementation funds in 2001. Other steps may be funded with US EPA implementation funds, or through other appropriate federal programs identified in Tables 10.1 to 10.6 in the *NHEP Management Plan*. State funds available through natural resource management agencies such as NH DES or NH OSP could also support this action. Scientific research may be funded by these sources or through other academic research awards.

## REGULATORY NEEDS

None identified.

## EXPECTED BENEFITS

Tools and information to assist local decision-makers and developers in their efforts to improve stormwater management.

## MONITORING AND ENFORCEMENT

Pre- and post-construction monitoring to determine effectiveness of stormwater technology at the Hampton and Seabrook facilities.

## TIMETABLE

This Highest Priority action will be initiated in 2001.

+++

### PRIORITY

Highest Priority. Implementation of this action does not depend on the implementation of other Action Plans in the *NHEP Management Plan*, however the information gained from this action should be used in WQ-10.

## ACTION WQ-9

PRIORITY

STORMWATER

++

Ensure that water quality and quantity impacts from new development or redevelopment are minimized to the maximum extent practical at the planning board stage of development.

### BACKGROUND

As development increases so does runoff to storm-drainage systems. These drainage systems are often not upgraded to handle the additional load. The resulting stormwater discharges ultimately add increased water volume during storm events to streams, rivers, and estuaries. Base flow often decreases as impervious surfaces are laid over undeveloped land. Careless development can result in impacts to surface waters and groundwater, including receiving increasing amounts of sediment and contaminants without buffering capacity to filter, dilute, and absorb the pollutants. Many towns in the NHEP study area use the site-plan review process to address post-construction stormwater management. Action WQ-9 assists municipalities in their local stormwater management control efforts.

Under the site-specific law all projects disturbing 100,000 sq. ft. or more require a permit from the NH Department of Environmental Services. For lands under the jurisdiction of the state Comprehensive Shoreland Protection Act (CSPA) the threshold requiring a permit drops to 50,000 sq. ft. NH DES engineers review development plans to ensure that water quality is protected both during and after construction, through the use of temporary and permanent stormwater controls, and other best management practices. Smaller projects often pose similar risks to water resources, but are often not reviewed for potential impacts by the local community.

By March 2003 EPA will require Phase II NPDES stormwater management permits for discharges from small municipal separate storm sewer systems, and from construction sites disturbing between one and five acres.

### ACTIONS/ACTIVITIES

- 1 Update and amend the documentation of NHEP study area ordinances produced in the NHEP Base Program Analysis, if necessary.
- 2 Review stormwater management strategies and innovative model ordinances from other states, e.g., Massachusetts Department of Environmental Protection Stormwater Management Strategy.
- 3 Refer to the NHEP Base Program Analysis to determine which communities lack erosion and sediment control ordinances for projects below the 100,000 sq. ft. or 50,000 sq. ft. state thresholds. Using model ordinances and technical manuals, regional planning commissions will work with municipalities to create local ordinances to minimize impacts to water resources, such as requiring that development proposals include on-site stormwater treatment.
- 4 Coordinate local ordinance requirements with relevant state agencies such as the Department of Transportation, Department of Environmental Services, and the Office of State Planning to ensure consistency with state regulations.
- 5 Encourage adoption of protective ordinances for projects greater than 20,000 sq. ft.



## RESPONSIBLE PARTIES

Regional Planning Commissions as lead agency (Steps 3-5) with assistance from communities, Department of Transportation, Department of Environmental Services, and Office of State Planning. A consultant will complete Steps 1-2.

## IMPLEMENTATION LOCATION

This Action Plan can be implemented in all 43 communities in New Hampshire's estuarine watershed.

## COSTS

Researcher in Steps 1-2	\$7,000
RPC Circuit rider in Steps 3-5	\$10,000
Coordination activities (e.g. meetings, conference calls) in Steps 1-5	\$3,000
<b>Total</b>	<b>\$20,000</b>

## FUNDING

This action may be funded in part through US EPA NHEP implementation funds (except for coordination costs), or through other appropriate federal programs identified in tables 10.1 to 10.6 in the *NHEP Management Plan*. State funds available through natural resource management agencies such as NH DES or NH OSP could also support this action.

## REGULATORY NEEDS

- Changes to local ordinances and building codes.
- Possible municipal regulation related to access to existing town- or city-owned storm drainage infrastructure.
- Possible state regulation related to access to existing state-owned storm drainage infrastructure.

## EXPECTED BENEFITS

Reduction and prevention of sedimentation and contaminant load to coastal region surface waters.

## MONITORING AND ENFORCEMENT

Municipal enforcement of local building codes and plan specifications. Possible state enforcement where appropriate in cases of use of state-owned and/or maintained storm drain systems.

## TIMETABLE

Initiate by 2005. Opportunities to implement this High Priority action will be pursued in the next four years.

### PRIORITY

High Priority. Implementation of this action does not depend on implementation of other Action Plans in the *NHEP Management Plan*.



## ACTION WQ-10

PRIORITY

+++

STORMWATER

Research the use and effectiveness of the Stormwater Management and Erosion and Sediment Control Handbook for Urban and Developing Areas in New Hampshire. Revise, publish, and promote the Handbook.

### BACKGROUND

In 1992 the United States Department of Agriculture Natural Resource Conservation Services (formerly Soil Conservation Service), the Rockingham County Conservation District, and NH DES published a handbook for developers entitled Stormwater Management and Erosion and Sediment Control Handbook for Urban and Developing Areas in New Hampshire, commonly referred to as the “Green Book.” The Green Book provides technical guidance on preventing soil erosion and controlling sediment loss on lands being developed for residential, commercial, industrial, and recreational use.

The Green Book is widely used in developing plans, but occasional non-compliance and incorrect implementation of Best Management Practices (BMPs) continues to be a problem at construction sites. This Action will help communities and developers comply with Phase II stormwater management NPDES permit regulation of discharges from construction sites disturbing between one and five acres.

### ACTIONS/ACTIVITIES

- 1 Compile a list of the current education activities by a variety of organizations including DES, OSP, and the Conservation District, that promote the use of the Green Book.
- 2 Concurrent with Step 1, research developments under construction and completed construction projects that were permitted through the Alteration of Terrain Program to determine what BMPs were implemented incorrectly, and if there is resistance to using BMPs. Identify areas of compliance and noncompliance for the designed BMPs (completed in 2000).
- 3 Rewrite the Green Book to reflect the knowledge gained from the Step 2 research (completed in 2000).
- 4 Develop education programs, or coordinate with existing efforts identified in Step 1, that include positive incentives for contractors and local officials to implement BMPs correctly. Use information gathered from Steps 1 and 2 to educate target audiences.

### RESPONSIBLE PARTIES

NH DES will be the lead agency and coauthor of the revised Green Book (Steps 1-3) with assistance from NRCS, County Conservation Districts. These groups plus NHEP outreach, and the OSP/NHCP will complete Step 4.

### IMPLEMENTATION LOCATION

This Action Plan will be implemented in all 43 communities in New Hampshire’s estuarine watershed.

## COSTS

Research and field study in Step 2 (complete)	\$0
Rewrite Green Book in Step 3 (complete)	\$0
Publish and distribute Green Book in Coastal watershed in Step 3	\$30,000
Program development and implementation of education and outreach activities in Steps 1 and 4	\$10,000
<b>Total</b>	<b>\$40,000</b>

## FUNDING

This action may be funded in part through US EPA NHEP implementation funds, or through other appropriate federal programs identified in Tables 10.1 to 10.6 in the *NHEP Management Plan*. State funds available through natural resource management agencies such as NH DES or NH OSP will also support this action.

## REGULATORY NEEDS

Study findings may indicate need for possible rule changes.

## EXPECTED BENEFITS

- Reassessment and update of currently recommended erosion and sediment control BMPs.
- Increased compliance with erosion and sediment control practices.
- Information gathered through the evaluation of BMP compliance will strengthen the technical assistance efforts of NH DES, NRCS, and Conservation Districts
- Understanding of the reasons for noncompliance should result in more useful BMPs and greater compliance with erosion and sediment controls.
- All the above improvements should result in less erosion from construction and development sites and less sedimentation of estuarine waters.

## MONITORING AND ENFORCEMENT

Municipal building inspectors should ensure that BMPs are correctly implemented. Direct NH DES enforcement if local efforts fail or are inadequate.

## TIMETABLE

This Highest Priority action will be completed by 2004.

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### PRIORITY

Highest Priority. Implementation of this action is not dependent on implementation of other actions listed in the *NHEP Management Plan*.

## ACTION WQ-11

Revise state industrial discharge permit criteria in response to new processing technology, and re-evaluate existing permits.

PRIORITY

PERMITTED  
DISCHARGES

+

### BACKGROUND

Throughout New Hampshire's estuaries some toxic contaminants are found, mostly as the legacy of historic industries trapped in sediments. Although these contaminants are generally below federal alert levels, the continuing existence of acute low-level inputs demands vigilance. NPDES permits for point sources discharging into the state's estuarine and coastal waters thus monitor for these contaminants.

New technology is available for reducing chemical waste. In many cases alternative chemicals or processes can be used that avoid the generation of toxic wastes. In other cases, toxic chemicals can be recycled and recovered at the plant before discharge into the common sewage stream. While many large companies are already participating in EPA programs, this Action Plan would focus on those that are not, including small companies. Industrial, academic, and health organizations hold permits for discharge into coastal and estuarine waters. Pretreatment can be required under current regulations.

### ACTIONS/ACTIVITIES

- 1 NH DES will review existing small dischargers' permits for substances and amounts, both permitted and actual discharges. These permits allow direct discharge to surface waters. Investigate the use of computer software to make this process more efficient.
- 2 NH DES will review the municipal pre-treatment program, evaluate opportunities for new pollution prevention, and strengthen the program as appropriate. Pre-treatment permits refer to industrial wastes that are discharged to a wastewater treatment plant.
- 3 Identify substances and/or processes which can be modified to reduce toxic waste. This study could be done by a contractor, or by a consultant in cooperation with NH DES and EPA.
- 4 Using the information gained from the study, NH DES would re-evaluate permitted discharges, considering the potential for reduction, public and estuary health, and social and economic benefits of the industry.
- 5 NH DES would set up a time-table for reduction and/or fees for public facility treatment and/or remediation for those dischargers under new permit criteria. NH DES would develop positive incentives for businesses and industries to implement pollution prevention strategies.

### RESPONSIBLE PARTIES

NH DES will be the lead implementer for this action.

## IMPLEMENTATION LOCATION

To be implemented first in Zone A, and then extended to Zone B.

## COSTS

NH DES investigations in Steps 1, 2, 4, 5	\$50,000
Potential funding sources: permit fees, NHEP, NHCP	
Outside consultants/study in Step 3	\$50,000
Potential funding sources: NHEP, CICEET or NH DES (fees)	
<b>Total</b>	<b>\$100,000</b>

## FUNDING

This action may be funded in part through US EPA NHEP implementation funds, or through other appropriate federal programs identified in tables 10.1 to 10.6 in the *NHEP Management Plan*. State funds available through natural resource management agencies such as NH DES or NH OSP could also support this action. Funding from permit fees and traditional academic avenues should be considered.

## REGULATORY NEEDS

Revision of permit criteria and implementation.

## EXPECTED BENEFITS

Reduced toxic waste accumulation, particularly in filter-feeding shellfish and in sediments.

## MONITORING AND ENFORCEMENT

Not applicable, except through revised NPDES permits.

## TIMETABLE

Initiate by 2007. This Priority action will be implemented as funds and resources become available.

### PRIORITY

Priority. Implementation of this action is not dependent on implementation of other actions listed in the *NHEP Management Plan*.



## ACTION WQ-12A

Acknowledge and support the oil spill prevention and response activities of the Piscataqua River Cooperative.

PRIORITY

OIL SPILLS

+

### BACKGROUND

Many oil spills of a wide range of volumes have occurred in coastal New Hampshire waters. From 1975-79, there were 103 reported spills in public waters. While most of those incidents were of small volumes, the nine spills of greater than 500 gallons accounted for 95% of total oil spilled. The most recent large spill was the July 1, 1996 spill of approximately 1,000 gallons of #6 fuel oil from the vessel Provence into the Piscataqua River. Investigators are still studying the impacts of this spill. Several preventable oil spills have occurred because of vessels that leaked due to poor condition or maintenance, dock line failure, or pump connection failure.

The Piscataqua River Cooperative was initially formed in 1967 as the Portsmouth Harbor Oil Spill Committee and incorporated in 1971. It was renamed and restructured in the early 1990s as a 501c(4) "Social Benefit" spill cooperative under United States IRS code, and as a 301A Cooperative under NH law, to more clearly identify its function and the region. As a 301A cooperative, the Co-op could retain nonprofit status and sign mutual aid agreements. A mutual aid agreement was signed with the US Navy/Portsmouth Naval Shipyard, the first non-governmental mutual aid agreement signed by the US Navy. The Shipyard added large and small equipment; trained personnel; response experience; shipyard background; and a strong desire to protect the port to the Cooperative's mid-sized equipment, trained personnel, experience with high currents/large vessel operations, and drive to protect the port. If the Piscataqua River Cooperative is ever dissolved for any reason, all of its assets go to the State of New Hampshire for response use in the port and related areas.

The Piscataqua River Cooperative's mission is to:

- Prevent, respond to, and minimize impacts from oil and hazardous substances in the marine environment.
- Coordinate responses from start to the point of transfer of command to the responsible party. If asked, the Cooperative stays to assist in the response as long as deemed necessary.

Piscataqua River Cooperative member companies include Irving Oil Terminals, Inc., Public Service Company of NH, and Sprague Energy Corporation, with Portsmouth Naval Shipyard as Mutual Aid Partner.



## ACTIONS/ACTIVITIES

- 1 The NHEP staff will develop a relationship to the Cooperative, and communicate on a quarterly basis.
- 2 The New Hampshire Estuaries Project should assist and publicize the activities of the Piscataqua River Cooperative as needed and as appropriate.

## RESPONSIBLE PARTIES

NHEP, Piscataqua River Cooperative.

## IMPLEMENTATION LOCATION

Zone A

## COSTS AND FUNDING

No additional costs anticipated.

## REGULATORY NEEDS

None identified.

## EXPECTED BENEFITS

Continued prevention of and preparedness for oil spills.

## MONITORING AND ENFORCEMENT

None identified.

## TIMETABLE

This Priority action will be initiated in 2001.

### PRIORITY

Priority. Implementation of this action is not dependent on implementation of other actions listed in the *NHEP Management Plan*.

## ACTION WQ-12B

Enhance oil spill clean up efforts through pre-deployment infrastructure and development of high-speed current barriers.

PRIORITY

OIL SPILLS

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### BACKGROUND

Standard oil booms will fail if its perpendicular component is facing current of over 0.6-1.0 knots. Piscataqua River currents are 2-3 knots. Use of angled booms is the current strategy, but it requires long lengths, and large anchoring forces (1,000-10,000 lbs.). Preset moorings at critical spots would speed the deployment process.

New oil barriers are under development that can hold 2-3 times as much as a standard boom. This technology needs to be developed and implemented.

### ACTIONS/ACTIVITIES

- 1 Place moorings at a few critical locations for attaching deflection booms. The Piscataqua River Cooperative, US Coast Guard, NH DES, and Port Authority would select locations in consultation with other users.
- 2 The groups listed above with assistance from NHEP will identify support for efforts at UNH to develop and field test fast-current oil barriers.

### RESPONSIBLE PARTIES

CICEET

### IMPLEMENTATION LOCATION

This Action Plan will be implemented sections of the Piscataqua River or other locations deemed appropriate for research of high speed current barriers.

### COSTS

Moorings and placement in Step 1	\$50,000
New technology (Fast Current Oil Barriers) in Step 2	\$200,000

### FUNDING

This action may be funded by CICEET or in part through US EPA NHEP implementation funds or through other appropriate federal programs identified in tables 10.1 to 10.6 in the *NHEP Management Plan*. State funds available through natural resource management agencies such as NH DES or NH OSP will also support this action. Funding or in kind contributions to the implementation of this Action Plan from the USCG, Merchant Marine Service and traditional academic avenues should be considered. Potential funding sources for moorings and placement include an oil import fee and the Cooperative.

## REGULATORY NEEDS

Establishment of moorings and buoys.

## EXPECTED BENEFITS

Faster and more reliable oil spill response.

## MONITORING AND ENFORCEMENT

Enforcement: US Coast Guard, Port Authority, NH DES.

## TIMETABLE

Initiate by 2005. Opportunities to implement this High Priority action will be pursued in the next four years as funds and resources become available.

## PRIORITY

High Priority. Implementation of this action is not dependent on implementation of other actions listed in the *NHEP Management Plan*.



## ACTION WQ-13

Provide septic system maintenance information directly to shoreline property owners, and to other citizens of the Great Bay and coastal watersheds to help improve water quality.

PRIORITY

+++

SEPTIC  
SYSTEMS

### BACKGROUND

In the New Hampshire Seacoast region, 35% of tidal shorelands are already developed, and 28% of the remaining shoreline is potentially available for further development – not restricted by permanent conservation easements or natural resource constraints. The activities of shoreline property owners can significantly influence the water quality of the estuaries.

Many shoreline areas rely on private septic systems for sewage and wastewater disposal. Because of their proximity to the estuary, proper septic system maintenance is a valuable message. The shoreline property owner database allows the NHEP to contact shoreline property owners directly and relate important information regarding the care and maintenance of their septic systems.

Many homeowners mistakenly think that once a septic system is installed it will work forever without maintenance. If a system is not taken care of, it will become clogged and overflow on the ground or cause wastewater to back up into the house. Preventing system failure is cheaper and easier than repair. A neglected system will likely fail, leaving a homeowner with unsanitary backups, overflows, and expensive repairs. Overflows in the ground will ultimately reach and pollute water resources.

### ACTIONS/ACTIVITIES

NHEP outreach or other coastal outreach personnel will increase public awareness of septic system maintenance in the following ways:

- 1 Examine existing educational materials on septic system maintenance and in-home best management practices.  
  
Develop written materials that describe the principles of septic system operation and maintenance, using information available through NH DES and others.
- 2 Distribute septic system maintenance information to shoreline property owners using private septic systems.
- 3 Mail these materials to residents of areas where septic systems are used.
- 4 Give written materials to real estate offices to present to new home owners.
- 5 Submit articles to newspapers and newsletters regarding septic systems and advertising informational sessions.
- 6 Distribute written materials to town clerks to make available to residents.
- 7 Include this information on the CICEET Great Bay Radio broadcasts.

## RESPONSIBLE PARTIES

NHEP, or other coastal outreach personnel, will act as the lead implementer of this Action Plan with assistance from and coordination with real estate agents, communities, homeowners, NH DES, UNH Cooperative Extension, UNH Sea Grant, New Hampshire Coastal Program, Strafford Regional and Rockingham Planning Commissions, Rockingham and Strafford County Conservation Districts, and the Granite State Designers and Installers (Steps 1-7). The Great Bay Stewards will be contacted for topical materials and publications, and contact and technical information.

## IMPLEMENTATION LOCATION

This Action Plan will be implemented in all 43 communities in New Hampshire's estuarine watershed.

## COSTS

Staff (NHEP outreach)	\$0
Develop/enhance existing septic system outreach material in Step 1	\$2,000
Printing in Step 1	\$5,000
Mailings in Steps 2, 3, 4, 6	\$2,000
Informational sessions in Steps 5, 7	\$2,000
<b>Total</b>	<b>\$11,000</b>

## FUNDING

This action may be funded in part through US EPA NHEP implementation funds, or through other appropriate federal programs identified in Tables 10.1 to 10.6 in the *NHEP Management Plan*. Staff costs can be borne in the NHEP outreach budget. State funds available through natural resource management agencies such as NH DES or NH OSP will also support this action.

## REGULATORY NEEDS

None identified.

## EXPECTED BENEFITS

- Reduction of septic pollutants reaching estuarine and coastal waters
- Increased life of on-site waste disposal systems
- Greater awareness of water quality issues for shoreline property owners
- Improved septic system maintenance in critical shoreland areas

## MONITORING AND ENFORCEMENT

None identified.

## TIMETABLE

This Highest Priority action will be initiated by 2004.

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### PRIORITY

Highest Priority. Implementation of this action is not dependent on implementation of other actions listed in the *NHEP Management Plan*.



## ACTION WQ-14

Encourage the use of innovative, alternative technologies for failing septic systems to help improve water quality.

PRIORITY

SEPTIC  
SYSTEMS

++

### BACKGROUND

Conversion from seasonal to year-round use places stress on shorefront home septic systems. Failures occur if the load exceeds the capacity of the leach field or the pipes become clogged. Replacing a failed system is often hindered by lack of good soils or space on the existing lot. Adjacent land is often not available for use by the homeowner for replacing the septic system. New alternatives are needed for homeowners caught in the bind of upgrading the system without the appropriate environmental conditions to meet state regulations. This Action Plan is not intended to encourage or allow new development on marginal sites, but rather to repair or replace existing, failed septic systems. The NH Department of Environmental Services recently adopted new rules that allow alternative technologies for subsurface disposal systems, but further effort is needed to ensure their acceptance and implementation.

### ACTIONS/ACTIVITIES

- 1 Review and evaluate the most promising types of innovative and alternative technologies best suited for New Hampshire conditions and locations. Select the most promising suite of technologies for use in the estuarine and coastal watersheds. This study should include discussions with the designers and installers currently working in the Seacoast, and involve NHEP, NHCP, NH DES, UNH/JEL, CICEET and Granite State Designers and installers.
- 2 Pursue provisional approval from NH DES under new rules Env-Ws 1024, which requires additional research and monitoring of the new technologies and documenting their performance. This will be done by objective third parties, such as the University of New Hampshire or other consultant.
- 3 Seek general approval from NH DES for the use of provisionally approved technologies. This requires sufficient operating history to allow general use of the technology. A design-specific manual will be written for each technology to avoid any contradictions with other sections of NH DES rules.
- 4 NHEP and Granite State Designers and Installers conduct workshops for designers and installers on the approved technologies and encourage their use in the appropriate situations.
- 5 To the extent practicable, ensure that the new technologies are used only for failed septic systems of existing structures only.



## RESPONSIBLE PARTIES

The NHEP is the lead implementer and will coordinate with NHCP, NH DES, UNH/JEL, CICEET and Granite State Designers and Installers (GSDI) help to direct the research (Steps 1-3). Monitoring and intensive research to be done by UNH or a consultant (Step 2). The NHEP and GSDI will conduct workshops (Steps 4-5).

## IMPLEMENTATION LOCATION

All 43 towns in the coastal watershed.

## COSTS

Research most promising technologies in Step 1	\$5,000
Research and monitoring for provisional approval in Step 2	\$40,000
Continued research for general approval in Step 3	\$40,000
Outreach in Step 4	\$5,000
<b>Total</b>	<b>\$90,000</b>

## FUNDING

This action may be funded in part through US EPA NHEP implementation funds, or through other appropriate federal programs identified in Tables 10.1 to 10.6 in the *NHEP Management Plan*. State funds available through natural resource management agencies such as NH DES or NH OSP will also support this action.

## REGULATORY NEEDS

Possible administrative rule changes.

## EXPECTED BENEFITS

Improved water quality.

## MONITORING AND ENFORCEMENT

None identified.

## TIMETABLE

Initiate by 2005. Opportunities to implement this High Priority action will be pursued in the next four years as funds and resources become available.

## PRIORITY

High Priority. Implementation of this action is not dependent on implementation of other actions listed in the *NHEP Management Plan*.

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## ACTION WQ-15

PRIORITY

AIR QUALITY

Support efforts to reduce deposition of atmospheric pollutants through eliminating loopholes in current laws, encouraging the construction of more efficient power plants, and encouraging energy conservation.

### BACKGROUND

Fossil fuel-fired power plants emit pollutants that have immediate and long-term health effects on watersheds and estuaries. Pollutants of particular concern in New Hampshire include sulphur dioxide (SO<sub>2</sub>), which is an acidifier; nitrous oxide (NO<sub>x</sub>), which as nitrate is a plant nutrient; and various toxins including heavy metals such as mercury, lead, and chromium; and chemicals such as dioxins.

Different fossil fuels and combustion technologies produce varying amounts of pollutants. For example, a coal-burning power plant has the highest rates of generation (quantity per unit power generated) but contributes more sulfur and toxins than a fuel oil-burning plant. But fuel oil-burning plants are a significant source of mercury.

Plants' contributions of pollutants also depend on efficiency. Older plants, regardless of fuel type, run at about 30% efficiency, while modern plants run at approximately 55%. Even with significant improvements, aged power plants will not achieve these modern standards. Outdated plants remain in operation due to a loophole in the Clean Air Act Amendment of 1978, which exempted old plants from the clean air standards for new plants, making it economical to keep them in use.

The goal for the following supportive actions is to ensure that all operating local conventional plants should attain Best Available Control Technology (BACT) standards. The state will implement a phased-in uniform emissions standard, effectively eliminating Clean Air Act loopholes for older plants in-state. The state will encourage the replacement of older plants with newer gas-fired plants. Waste-to-energy plant regulations will be revised with strict limits on mercury and other toxic emissions.

For out-of-state plants, efforts should focus on educating Congress about the negative effects of pollution transport and suggesting ways to reduce it. Progressive reduction of the overall allocation of pollution credits would create an economic incentive for cleaner plants.

### ACTIONS/ACTIVITIES

The NHEP Management Committee should endorse the following actions:

- 1 Revise state standards to produce uniform standards which eliminate Clean Air Act loopholes and bring the local plants into BACT compliance. Discuss new waste-to-energy plant guidelines.
- 2 Implement tax credits or other rewards for exceeding BACT standards to encourage new plants to be cleaner than EPA guidelines.
- 3 If possible, hasten the construction of newer, cleaner, gas-fired power plants. Discuss further reduction of NO<sub>x</sub>.

- 4 With the State Energy Office, increase participation in and funding for conservation programs. Options include the federal Million Solar Roofs program; electric conservation technologies including alternative lighting and power generation; programs to disseminate information on conservation technologies; and a program to investigate and promote promising, viable technologies reaching commercialization (e.g., house sized fuel-cells, which should be available within two years).

### RESPONSIBLE PARTIES

The NHEP will serve as the implementer of this action in cooperation with the NH Energy Office (Steps 1-4).

### IMPLEMENTATION LOCATION

Not applicable

### COSTS AND FUNDING

No additional costs (to be done by existing staff).

### REGULATORY NEEDS

None identified.

### EXPECTED BENEFITS

Building support for reducing air pollution, and building a bridge to others interested in the environmental impacts of airborne pollutants.

### MONITORING AND ENFORCEMENT

None identified.

### TIMETABLE

Initiate by 2007. This Priority action will be implemented as funds and resources become available.

### PRIORITY

Priority. Implementation of this action is not dependent on implementation of other actions listed in the *NHEP Management Plan*.

## ACTION WQ-16

Find funding sources for key water quality strategies.



### BACKGROUND

Finding and securing funding for environmental projects is not always easy. Fortunately, obtaining support is easiest for projects that result in real improvements, and the high-priority of coastal zones for many agencies results in allocation of significant financial resources for coastal areas. Each NHEP partner is aware of potential funding sources for New Hampshire coastal projects. Centralizing and sharing this information would help implement all of the key strategies in this Plan.

This action would help obtain funding to implement the Water Quality strategies. The resulting searchable database will be available to all NHEP partners, and could be stored on a partner's website server for on-line searching. Links to existing directory pages can avoid duplication of services.

### ACTIONS/ACTIVITIES

- 1 Each partner participating in the NH Estuaries Project should submit a list of known funding sources, including program name, owner or organization which passes through funds, award range, funding cycle and deadline dates, and contact information including internet address and e-mail.  
  
The list should note categories for project funding such as monitoring, construction, geographic restrictions, etc. Most grant sources will have multiple categories.
- 2 NHEP will create a database in a common software program. Agency, nonprofit, or academic partners can contribute expertise or provide volunteers to build the database structure. One partner should agree to store the database during development.
- 3 Additional library and Internet research could locate additional funding sources not identified by the partners.
- 4 Partner staff or volunteers will enter data and eliminate duplications.
- 5 The database will be uploaded and stored on one partner's website and made available for searches. Hyperlinks to funding sources and other contacts may be added to the on-line version. The partners may decide whether to restrict access to the site or make it available to the public.
- 6 NHEP will promote use of the database.

### RESPONSIBLE PARTIES

The NHEP will be the lead implementer of this Action Plan (Steps 1-6).

## IMPLEMENTATION LOCATION

Not applicable

## COSTS

Purchase of software if necessary	\$500
Staff time to create database and enter data in Steps 1-4 (can be supplemented by volunteers)	\$7,000
Maintenance of database such as updates and annual updates in Step 5	\$2,500
Promotion of database in Step 6	\$5,000
<b>Total</b>	<b>\$15,000</b>

## FUNDING

This action may be funded in part through US EPA NHEP implementation funds. State funds available through natural resource management agencies such as NH DES or NH OSP will also support this action.

## REGULATORY NEEDS

None identified.

## EXPECTED BENEFITS

A funding resource database that is easy to use and update.

## MONITORING AND ENFORCEMENT

Not applicable.

## TIMETABLE

This Highest Priority action will be completed by 2004.

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### PRIORITY

Highest Priority. Implementation of this action will greatly enhance implementation of many other Action Plans.

## ACTION WQ-17

Coordinate public tours of wastewater treatment facilities

PRIORITY

WATER  
QUALITY  
OUTREACH

### BACKGROUND

All estuarine watershed residents need to understand basic fundamentals of the water cycle, watersheds, how water flows to and from buildings, and what happens to the water once it disappears down a drain. Such understanding will encourage residents to help conserve and protect water resources.

The tax-paying public, advocacy groups, shoreline property owners, construction industry associations and commercial/industrial groups, and children were identified by various NHEP focus groups and committees as key audiences to learn about wastewater treatment facilities, their operation, overloading, and combined sewer overflows. Each audience needs specific information to help them protect water resources. This information includes the basic fundamentals of the water cycle, watersheds, how water flows to and from buildings, and what happens to water once it leaves people's surroundings. Each audience should have a message directed to their needs, in a friendly medium, from a credible person or organization.

The general public should understand how water flows to and from their home, the effects of bacteria and toxic chemicals on water quality, and how residents and homeowners can protect water quality, including the need for community support for funding of construction, repair, and maintenance of WWTF infrastructure.

Children should understand how water flows to and from their home, the water cycle, and watersheds. Basic understanding of water is important for future understanding and decision-making, and children will also educate their parents.

Advocacy groups and shoreline-property owners are important as opinion-leaders and influencers of officials, media, and the public. Educated advocacy groups will help educate the press, and also influence policy development and natural resource management.

Educational collaboration with construction industry associations and business groups will help the business community understand how their activities affect a town's wastewater treatment capacity; how they can be pro-active (e.g., educating new homeowners on water conservation), and how funding for wastewater treatment facility upgrades is important for economic growth and development.



## ACTIONS/ACTIVITIES

- 1 The NHEP, or other outreach organization, will promote and coordinate tours of area municipal wastewater treatment plants.
- 2 Tours will be conducted by plant managers or other plant employees.
- 3 Identify existing information materials on these three topics or develop new pamphlets to provide to tour participants:
  - the basic natural water cycle;
  - the water cycle of a home (water entering/leaving the home); and
  - how homeowners can conserve water.
- 4 To invite the public to these tours, the NHEP and participating towns will put notices in water bills, tax bills, or other notices that homeowners might receive. Advocacy and business and industry groups could publicize the field trips in their newsletter calendars of events. Tours could also be publicized in newspapers or community calendar postings.

## RESPONSIBLE PARTY

The New Hampshire Estuaries Project or other outreach organization would be responsible for identifying communities willing to open their facilities for tours, coordinating the tours with town officials and facilities managers, and assisting in tour promotion within the participating communities (Step 1-4). The plant managers would be responsible for the actual tours (Step 2). Watershed advocacy groups may assist in the promotion and implementation of the tour events (Step 4).

## IMPLEMENTATION LOCATION

This Action Plan will be implemented in communities with wastewater treatment facilities throughout the 43 communities in New Hampshire's coastal watershed.

## COST

Tour costs would be absorbed by the towns in Step 2	
Photocopying of existing pamphlets (per tour) in Step 3	approx. \$100.00
Publicity costs in Step 4	approx. \$100.00
<b>Total</b>	<b>approx. \$200.00</b>

## FUNDING

This action may be funded in part through US EPA NHEP implementation funds. State funds available through natural resource management agencies such as NH DES or NH OSP could also support this action. Towns might get grants from WWTF associations or water associations. Copying of the pamphlets could be done by the state or the NHEP.

## EXPECTED BENEFITS

An educated voting public more willing to fund wastewater treatment plants and elimination of combined sewer overflows. The tours will raise awareness of watershed and water-cycle issues, water quality problems and solutions, and help residents understand the connection between their use of water and the costs and processes of treating wastewater.

## MONITORING AND ENFORCEMENT

Ways of monitoring success of these tours might be a long term (10-20 yrs) look at voter support for and opposition to funding WWTFs and combined sewer overflow elimination in the Great Bay and coastal watersheds.

## TIMETABLE

Initiate by 2007. This Priority action will be implemented as funds and resources become available.

### PRIORITY

Priority. Implementation of this action is not dependent on implementation of other actions listed in the *NHEP Management Plan*.



## ACTION WQ-18

Support and coordinate stormwater technical workshops.

### BACKGROUND

Non-point source pollution – particularly contaminated stormwater – is a high priority for the New Hampshire Estuary Project. Beginning in March 2003, Phase II of EPA's stormwater management NPDES permit program will extend regulations to discharges from construction sites disturbing between one and five acres, and discharges from small municipal separate stormwater systems in urbanized areas. Post-construction stormwater management in new development and redevelopment situations is also important to protecting water quality. Phase II requirements also include pollution prevention through good housekeeping practices for municipal operations.

Stormwater-related outreach Action Plans aim to increase public understanding of the direct links between people, stormwater, and other sewage issues, and of the importance of regional water quality to the unique character of the New Hampshire Seacoast. Educating the tax-paying public and municipal officials responsible for stormwater management about the profound impacts of contaminated stormwater on water quality and environmental character requires making the connections clear between everyday activities and the pollution that results.

Existing training courses include NH Department of Transportation Construction School and UNH Technology Transfer Program. The New Hampshire Stormwater Tradeshow showcases tools for controlling and treating stormwater runoff. The 1998 event was attended by 200 engineers, planners, regulators and public works employees.

New rules for NPDES stormwater discharge permits published in December 1999 require a permit and monitoring for new construction sites and impervious surfaces that disturb from one to five acres. Permits will be required starting March 2003, and must include development and implementation of a stormwater pollution prevention plan with best management practices to control runoff. Workshops will be needed to explain the new rules to town boards and DPW personnel. NH DES will be responsible for writing the rules, and EPA will assist with implementation.

The NHEP Outreach and Education Project Team identified five primary audiences for stormwater outreach activities: WWTF managers, public works departments, engineers, planning boards, and conservation commissions.

### ACTIONS/ACTIVITIES

Conduct training for public works employees, road agents, NH Department of Transportation personnel, and others on reducing, treating, and improving the quality of stormwater. Use materials such as the New Hampshire Office of State Planning sedimentation and erosion control video, and the catalogue of available non-point source resources.

## SUMMARY MATRIX OF STRATEGIES FOR STORMWATER OUTREACH

	Facility Managers	Public Works Departments	Engineers	Planning Boards, Conservation Commissions, and Wetlands Bureaus
<b>Messages</b>	How to manage, new technology, non-point source	Construction of, how to manage, new technology	New technology	How to manage, new technology, non-point source
<b>Methods</b>	Workshops	Demonstration projects	Workshops	Meetings, Pamphlets, Workshops (?)
<b>Delivery</b>	Towns, state, organizations	Towns	Towns, state, organizations	State, organizations, facilities managers, public works departments
<b>Funding</b>	Towns, states	Towns	State, organizations	State, organizations

### RESPONSIBLE PARTY

The NH Estuaries Project will be the lead implementer of this Action Plan with assistance from NH DES and NHCP to develop relationships with training providers, help promote workshops, and possibly provide financial assistance.

### IMPLEMENTATION LOCATION

This Action Plan will be implemented at various locations throughout the 43 communities in New Hampshire's estuarine watershed.

### COSTS

\$1,000 to \$5,000 per year depending on NHEP workplans and funding levels. Money for stormwater management workshops and education may be available through future NHEP Technical Assistance Grants Programs.

### FUNDING

This action may be funded in part through US EPA NHEP implementation funds, or through other appropriate federal programs identified in Tables 10.1 to 10.6 in the *NHEP Management Plan*. State funds available through natural resource management agencies such as NH DES or NH OSP could also support this action.

### EXPECTED BENEFITS

Stormwater information reaches beyond engineers to those implementing projects. The amount of stormwater runoff is kept to a minimum, and runoff is properly treated. Stormwater treatment systems are monitored and maintained.

### TIMETABLE

This Priority action will be initiated in 2000 with a workshop for NPDES Phase II communities. Further activities will be initiated as funds and resources are available.

### PRIORITY

Priority. Implementation of this action is not dependent on implementation of other actions listed in the *NHEP Management Plan*.

## ACTION WQ-19

Stormwater Awareness: Support and expand storm-drain stenciling programs.

### BACKGROUND

Many citizens in communities with storm-drain systems are unaware that these systems can be conduits for pollution. Storm-drain stenciling is a community-based activity that as part of an educational effort heightens participants' and residents' awareness of how land-based pollution sources can contaminate water. This Action aims for at least 100 people each year to participate in storm-drain stenciling activities in Great Bay watershed communities.

Experience shows that storm-drain stenciling programs enhance the knowledge of both children and adults about the consequences of stormwater runoff in their community. Adults often comment with some amazement that they "just didn't know that drain led to the river." Stenciling storm-drains paints environmental awareness on the face of a neighborhood, making a lasting connection and creating pride in environmental stewardship in even the most urban settings.

Storm-drain stenciling is a natural news-photo opportunity that fits well with environmental celebrations or events such as Coastweeks and the Coastal Cleanup. Organized region-wide environmental events can attract media and public interest that can significantly benefit all associated organizations, natural resource concerns, and provide a lot of fun for participants. This Action will also help communities comply with EPA's Phase II NPDES stormwater management program.

### ACTION/ACTIVITIES

Outreach and education staff from UNH Sea Grant Extension will:

- 1 Recruit community groups (schools, 4-H groups, scout troops, civic organizations, and others) to participate in storm-drain stenciling activities in their communities.
- 2 Conduct a non-point source pollution workshop with each stenciling group prior to activity.
- 3 Work with local Department of Public Works to determine appropriate locations and help secure safety cones and paints for stenciling.
- 4 Inform media contacts looking for local stories about the planned activity.
- 5 Prepare handouts to distribute in stenciled neighborhoods about the purpose of the activity, and alternatives to dumping hazardous materials down storm-drains.

## RESPONSIBLE PARTY

Outreach and education staff from UNH Sea Grant Extension will take the lead on this activity (Step 1-5). Americorps and other groups may also be trained to conduct the activity

## IMPLEMENTATION LOCATION

This Action Plan will be implemented in interested communities with municipal sewage and stormwater infrastructure in Zone A of New Hampshire's estuarine watershed.

## COST

	Per Year	Over 5 years
35 stencils per year in Steps 1-5	\$140	\$700
paint brushes in Steps 1-5	\$10	\$50
printing handouts in Step 5	\$100	\$500
staff time and misc. in Steps 1-5	\$1,000	\$5,000
<b>Total</b>	<b>\$1,250</b>	<b>\$6,250</b>

## FUNDING

This action may be funded in part through US EPA NHEP implementation funds, or through other appropriate federal programs identified in Tables 10.1 to 10.6 in the *NHEP Management Plan*. State funds available through natural resource management agencies such as NH DES or NH OSP could also support this action. UNH, Sea Grant Extension, and interested communities may also be sources of cash or in-kind contributions to the implementation of this Action Plan.

## EXPECTED BENEFITS

Anecdotal evidence indicates many adults in communities with storm drains do not realize that they drain directly into local water bodies. Benefits include:

- Increased awareness of the connection between land use and water pollution.
- Greater use of municipal hazardous waste collection and less use of storm drains for such waste.
- Increased awareness and implementation of household Best Management Practices to reduce non- point source pollution.

## TIMETABLE

This Highest Priority action was implemented in 1998, 1999, and 2000 with CICEET funds.



### PRIORITY

Highest Priority. Implementation of this action is not dependent on implementation of other actions listed in the *NHEP Management Plan*.





## ACTION WQ-20

Conduct an Estuarine Field Day for municipal officials.

### BACKGROUND

Much research is devoted to investigating more effective methods of stormwater management. However, municipal officials charged with stormwater oversight may find it difficult to keep up with the most recent advances in technology. This action calls for UNH and NOAA's Cooperative Institute for Coastal and Estuarine Environmental Technology (CICEET) to conduct a Great Bay Field Day for municipal officials to visit local demonstration and field research sites to learn about the latest management techniques.

The goal is for at least 60 local decision-makers to attend a half-day program designed to introduce them to technology and methods being developed to address estuarine contamination, including contamination entering the system through stormwater systems.

Future field days can be expanded to include local business people, regional planning commissions, watershed and advocacy groups, and other natural resource professionals, and to cover other topics such as wastewater treatment, septic systems, and more. Coastal watershed locations such as Little Harbor, Hampton-Seabrook Harbor, or inland sites higher up the watersheds may be considered for future field days.

### ACTION/ACTIVITIES

- 1 UNH Sea Grant Extension will invite municipal decision-makers from public works departments, planning boards, conservation commissions, etc. within the Great Bay watershed towns to participate in this educational event.
- 2 The event will introduce the use of innovative technology and techniques to help prevent and reduce contamination in the Great Bay Estuary. Great Bay Field Day will take participants to the field sites of different research projects. Participants will interact with the scientists, learn about the projects, and express their own perspectives on managing estuarine contaminants of municipal origin.

### RESPONSIBLE PARTY

Outreach and education staff from UNH Sea Grant Extension (Steps 1 and 2) will coordinate the field day, which will involve university faculty, staff, and students, and highlight the research of the Cooperative Institute for Coastal and Estuarine Environmental Technology. The NHEP can assist in the coordination of future field days.

## IMPLEMENTATION LOCATION

This Action Plan will be implemented as workshops with field components that may take participants to pertinent sites throughout the 43 communities in New Hampshire the estuarine watershed.

## COST

A grant from CICEET covered costs for the 1999 and 2000 field days. Proposed costs (not including indirect charges) are \$6,800 per field day. These costs cover staff time, local travel, promotional materials and supplies, printing of publications, research vessel rental, and room rental.

## FUNDING

A grant from CICEET covered costs for the 1999 and 2000 field days. This action may be funded in part through US EPA NHEP implementation funds, or through other appropriate federal programs identified in Tables 10.1 to 10.6 in the *NHEP Management Plan*. State funds available through natural resource management agencies such as NH DES or NH OSP could also support this action. UNH, Sea Grant Extension, and interested communities may also be sources of cash or in-kind contributions to the implementation of this Action Plan.

## EXPECTED BENEFITS

- Municipal decision-makers will help move innovative techniques and technologies from development to application.
- Scientists will learn first-hand about municipal leaders' concerns and problems regarding municipal sources of estuarine pollution.
- Municipal leaders and scientists will have an opportunity for open dialogue addressing environmental problems.

## TIMETABLE

This Priority action was initiated in 1999 and 2000 with CICEET funding. It will be continued as funds are available.

### PRIORITY

Priority. Implementation of this action is not dependent on implementation of other actions listed in the *NHEP Management Plan*.



